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A SURVEY ON HORSE USE AND MANAGEMENT IN HORSE CLUBS IN CHINA: A PILOT STUDY

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Abstract

During the past three decades, significant development of the Chinese equine industry has resulted in a rapid increase in the number of horses in the country. At the same time, many horse clubs face shortages of trained management personnel or specialists in equine science and technology. The objective of this survey was to document and evaluate horse management and use in Chinese horse clubs. A 29-question survey was developed using SurveyMonkey© and tested on a small pilot group before being revised and released to a general pool of participants. The questionnaire link was distributed through WeChat to specific personnel in selected Chinese horse clubs known to researchers. These personnel were asked to help distribute the questionnaire to other horse clubs. The survey was open for 8 wk, and reminders were sent out regularly. Twenty clubs completed the survey, with 11 (57.9%) representing eastern and northern parts of China. The oldest reporting club was established in 2002, while the newest opened in 2018. Fourteen of the clubs were membership based and reported providing services for 40-1000 members (mean 260) and 200-10,000 visitors in a typical year. A total of 1703 horses were reported, and horses under 15 yrs of age represented 84.6% (n=1449) of total horses. Only 1.8% of horses were older than 20 yrs. The ages of the oldest horses in a given club ranged from 10 to 25 years. Warmbloods made up the greatest number of imported breeds (30.8%), with Thoroughbreds and Arabians being the next most popular (17.9% and 15.4%, respectively). Mongolian horses (29.4%) were the most common indigenous breed. Major horse health problems included hoof-related issues (31.6%) and injuries (31.6%). Colic was reported as an issue in 23.7% of horse clubs. Four clubs reported no turnout space available, and only 5 clubs (20%) noted having access to turnout areas with grass.

Turnout size ranged from 50 to 30,000 m^2. Horses were turned out for 0-6 hr/d and 0-7 d/wk. Hay constituted the major volume of feed for horses, with concentrates and supplements being fed for multiple reasons. As in the United States, the majority of horses were used for recreation (20.45%). Other uses included breeding (17.46%), dressage (15.25%), jumping (10.29%), endurance (1.64%) and barrel racing (1.18%). Veterinarians, farriers, and nutritionists were the most needed skills, with training, stable management, coaches and riders following. Veterinaries and farriers were more often employed full-time by clubs, while dentists were usually part-time employees. Most (55%) respondents reported having nearly 40% of riders with certificate or degrees associated with equine science. The most common reason for a horse to leave a club was due to being sold, though no reason for the sale was collected. The months horses were most often used was between July and August, which corresponds with summer holidays. Horses were used between 4-7 d/wk during heaviest use. Daily logs were used in 40% of clubs to track horse use, and 36.7% reported having a single person in charge to prevent overuse of horses. Interestingly, 3 clubs (10%) reported having “no such situation” relative to overuse of horses. Although 38.8% of employees reportedly held a certificate or degree associated with equine science, foreign specialists were often employed to support club activities, including teaching general riding (42.9%) and dressage (21.4%). Over 26% came from France. Nearly 53% of respondents took part in events from 0-5 times a year. Data from this study can serve as a platform for future surveys and to begin development of education and training programs to improve horse management in China.

Key words: Horse use and management, Horse clubs, China

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Chapter 1. Introduction

China's history spans over 6000 years, and the recorded history of the Chinese horse industry could be dated back to descriptions of horses on Honan bones (Hopkins, 1935). The horse, which may have been domesticated in late Neolithic times, was used to pull chariots in the Shang (B.C. 1765-123) and Zhou (B.C. 1122-256) periods (Creel, 1965). Xie (1991) stated that at the beginning of Zhou Dynasty (B.C 2146-1675), horses were mainly used as meat animals. As time progressed, horses were typed as stock horses for reproduction, war horses for military, parade horses for festivals, draft horses for transportation, field horses for hunting, and "coward" horses (those deemed unsuitable for noble use) for laborious things. Horses were also used in games and for farming as early as the starting age of the Qing Dynasty (1636-1912 A.D.).

Today, China's horse industry is growing rapidly. However, Li et al (2016) stated that this industry was still in its infancy, and most horse clubs were facing shortages of professional management and specialists in equine science and technology. In an interview on the growing horse industry in China, it was noted that there were no standards for equine transportation, and no qualifications for veterinarians, farriers, riding schools, instructors and trainers, or breeding[1], leading to questions about horse management and use in China.

[1] Thoroughbred Racing Commentary (2014), Horse Welfare in China Must Keep Up with Growing Equine Industry, https://www.thoroughbredracing.com/articles/horse-welfare-china-must-keep-growing-equine-industry/

Statement of the Problem

A recent survey showed that there were 823 horse clubs in China in 2016[2] and 1452 clubs in 2017[3]. This is a very rapid increase in the number of clubs and people involved in the horse industry. This growth was concurrent with the importation of approximately 2300 horses in 2015[2] and another 1800 horses in 2016[3]. The extraordinary growth in the number of horses and clubs when combined with the lack of trained personnel raised some questions： how are horses being used and cared for in China, and what can people do to ensure that horse welfare keeps up with the growing equine industry?

Purpose of the Survey

In order to have an objective view on the entire picture of equine welfare in Chinese horse clubs, a survey evaluating horse use in Chinese horse clubs was distributed. It was hypothesized that horse use in Chinese horse clubs would meet the basic requirements of animal welfare, and potential problems such as shortages of expertise were under control.

A 29-question electronic survey was developed using SurveyMonkey® and was released to Chinese horse clubs. Questions covered demographics, including the location of the club and the number horses; horse use, feeding and management, and health issues; and personnel, including both Chinese and foreign specialists. The survey was released in November of 2018 and participants were given 8 wk to respond. Reminder e-mails were sent every 2 wk to encourage participation, and some provincial equine associations were asked to help promote the survey.

[2] 2016, Annual report: state of Chinese equestrian industry development. http://sports.sina.com.cn/o/e/2016-03-17/doc-ifxqnski7675728.shtml

[3] 2017, Annual report: state of Chinese equestrian industry development. http://www.horsing.org/article-2974-1.html

Limitations of the Survey

The survey was designed scientifically and objectively. Questions were based on basic horse science and technology, with knowledge of the Chinese horse industry and Chinese culture and tradition. Efforts were made to cover horse breeds, horse nutrition and feeds, horse health care and horse use. However, it could not be assured that all questions were fully understood, as some terminology commonly used in the horse industries of the United States and Europe did not translate easily into Chinese. Also, some aspects of Chinese culture and tradition could interfere with truthful and complete responses to the survey.

There were limited peer-viewed articles about horse use in China. As such, some questions were based on interviews and articles published in lay resources such as magazines and other periodicals. These articles were also used to reference information on the current status of the Chinese horse industry.

This survey was constructed to identify potential issues relative to horse use and management remaining in the Chinese horse industry. It was not designed to solve those problems. Follow-up research would need to be done to better address any issues.

Assumptions of the Survey

It was assumed that none of the survey questions would offend people's beliefs or their privacy, and that all associated people would fully understand that the survey intended to identify problems that may exist and to inspire the Chinese horse industry to improve. As such, it was also assumed that the survey would not cause any damage to the reputation of Chinese horse industry and that results of the survey would improve the international cooperation between the Chinese horse industry and other counties in horse science education, vocational training and horse trade. Finally, given the large number of clubs, it was assumed that over 300 horse clubs or farms would actively respond to the survey.

Significance of the Survey

Murray State University and Qingdao Agricultural University are planning to start a joint bachelor's degree program in Equine Science. Results of this survey could help improve the quality of educational programs and courses, as well as the availability of teaching materials, so that graduates would be well prepared for entry into the Chinese horse industry. Knowing where horse use and management stands in China could help mold the equine program's curriculum.

Chapter 2. Literature Review

China has a long history filled with rich culture, and many aspects have included horses. While the actual origin of the horse or location of the original domesticated horse is still a controversy, there is documentation on the use of the horse in China. In many aspects, it resembles the use of horses around the world.

Horse Use in Ancient China

Meat animals: China has had a tradition of consuming horse meat for thousands of years. Horse meat can be very tender and highly nutritious, though it has less fat than beef and it has a unique fragrance. Historically, it was thought to restore liver function, improve circulation, and enhance immunity in humans. At the same time, it was reputed to prevent anemia and arteriosclerosis. Horse meat was an important part of the cooking traditions of many countries in Europe, South America and Asia.

The history of horse use mainly as meat animals can be dated back to the beginning of the Zhou Dynasty (B.C. 2146-1675). However, some literature has suggested that there were non-edible qualities to horse meat. The《Compendium of Materia Medica》[4]stated that horse meat was characterized by being cold, pungent, bitter, and even poisonous for some kinds of bodily conditions in human beings. 《Golden Food Treatment》suggested that consuming horse meat might make the conditions of diarrhea worse (Xie, 1991). The《Compendium of

[4] In China, the author of ancient books or other documents may not be known. In this case, the brackets 《 》 are used to indicate the nature of the source of information.

Materia Medica》also claimed that eating horse liver could be deadly for people. 《Hua Zi's Materia Medica》noted that horse meat had to be cooked by boiling to eliminate poisonous elements. In historical Asian cultures, foods were considered to be “hot” or “cold”. Food that was too “hot” or too “cold” was considered to be bad for health. However, adding a “hot” component to food that was too “cold” could make it acceptable. In the case of horse meat, boiling it removed the “too cold” aspect and made it acceptable for consumption.

Stock for reproduction: There seems to be general agreement that the basic stock of early Chinese horses was the wild Przewalski's horses, improved through selected breeding by the Chinese, possibly crossing the indigenous horse with imported stock. One archaeological find indicated that at least some Chinese horses of the 10th century B.C. had a conformation remarkably similar to that of the typical "Mongol pony" of the present day (Creel, 1965). The earliest reported literature documenting horses kept for breeding and reproduction was in the 《Rites of Zhou》 (B.C. 2146–1675). However, according to the regime system of the Zhou Dynasty (B.C. 2146-1675), only the King of Zhou could keep breeding stock. This constraint was lifted during the Spring and Autumn Warring Period (B.C. 770–426), which finally allowed common citizens to keep breeding stock (Xie, 1991).

In Chinese history, there were three major events that promoted horse breed improvement. First, during the Han Dynasty (B.C. 202–220 A.D.), light breed horses were introduced into the country for the first time. These horses were more refined than other horses of the time and became known to for their service on the Silk Road (van Moorsel, 2010).

Second, Emperor Wudi of the Han Dynasty (B.C. 202–220 A.D.) sent a large military expedition to Ferghana in B.C. 102 to obtain approximately 30 "Heavenly Horses." These horses were prized as breeding stock (Stanley, 1988).

The largest introduction of new horses occurred during the Tang Dynasty (618–907 A.D.), when more than 20 new horse breeds were introduced from ethnic minorities and foreign

nations into Imperial China. There was a description of this event which said that early in the ninth century B.C., an attack by the Chinese on certain northern nomads resulted in the capture of a thousand horses (Creel, 1965). These included horses from Korea in the east, Arabia in the west, Siberia in the north, and India in the south. The introduced horses were called “Hu horses” and were mainly used for genetic improvement of local horse breeds and for strengthening the military power of the Empire. Selective breeding eventually resulted in the ‘Tang Horse’ (Ma, 1988; van Moorsel, 2010). After the founding of the People’s Republic of China, 1125 horses of 8 different breeds were imported from the former Soviet Union in 1952 to further improve horse breeding in China (van Moorsel, 2010).

Military use: While the first purpose of horse domestication was likely to provide meat (Qian, 1998), horses were eventually used in war. There seems to be no clear evidence that horses were ridden in China until very shortly before B.C. 300 (Creel, 1965). The discovery of chariot style vehicles in the Yin Ruins (B.C. 1319-1046) showed that some horse-drawn vehicles were used for wars. However, horses were not widely used for wars until in the warring states period (B.C. 425-220) when the nations in the Central Plains changed their chariots into cavalry to cope with the riders of the northern nomads. During the Northern and Southern Dynasties (B.C.420-589), the emergence of stirrups and improvement of saddles made horses "platforms for battle" and cavalry achieved unprecedented development (Xie, 1991). In addition to carrying soldiers in war, horses were used as military support by providing meat, milk, and blood as food for soldiers (Wang, 2007). From then on, cavalry played very important roles in every change of dynasties, even for the foundation of the People’s Republic of China, until nearly the end of the 20th century (Xie, 1991). In the 1980s, the cavalry was dismissed as a branch of the army in China, with only a few cavalry battalions and companies being kept for such tasks as resident patrols, rescue and disaster relief.

Parades, festivals, and rituals: According to《Rites of Zhou》 (B.C. 2146–1675), horses used for festivals and rituals were called “Qi horse”. Research suggested that dead nobility may have been buried with horses and carriages according to their rank or social status, showing their dignity and luxury to those who remained behind. For dead kings, these displays may have been intended to show the strength of that king’s rule and to secure the kings life of luxury in the next world（Xu,1995）. This is supported by the discovery of chariot pits, which are places where buried horses, carriages, and horse implements were found. Many horses and chariot relics were found in the Yin Ruins (B.C.1319–1046) in Anyang, Henan Province. During the Western Zhou Dynasty (B.C.1044–771) and the Spring and Autumn Period (B.C.770–426), the areas where horses and chariots were used greatly expanded, ranging from the north to the Western Zhou-Yan Nation Cemetery in Beijing, to the south to Western Zhou and Spring and Autumn Tombs in Anhui Province, Eastern Zhou tombs in Jiangsu Province and Spring and Autumn Tombs in Hunan Province, to the east to chariot pits in Shandong Province. No chariot pits have been found since the end of Western Han Dynasty (B.C. 206–8 A.D.) (Liu, 2008).

Message delivery and transportation: The employment of the horse for transportation could be distinguished by three phases as follows. One (the earliest) is its use for traction, including the pulling of chariots. The second is the use of the horse as a "moving seat," ridden simply as a means of transportation. The third is the development of the horse into a charger of war (Creel, 1965). A post horse was known to have exceptional speed and endurance, and was often used to deliver messages around China. The use of the horse in this way was second only to the military horse in the history of China. This is because ancient land transportation mainly depended on horses, regardless whether the post used riding horses or the station vehicle, many of which could not be used without horses. The post was first established in the Spring and Autumn Warring Period (B.C. 770–426) and became more developed during the Han (B.C.

202–220 A.D.) and Tang (618–907 A.D.) Dynasties, during which there were anywhere from 8-75 stations in every 30-mile stretch. During the Yuan Dynasty (1271-1368 A.D.), there were 20 to 400 horses at each post station and 300,000 horses in the whole country (Xie, 1991).

Farming and animal husbandry: Horse use for plowing was not always common in China's agricultural civilization, mainly because the military use of horses was more valued. As a result, plowing mainly depended on cattle (Chen, 2017). However, horses were used for farming as early as the early Qin Dynasty (B.C.221–207), where some farmers used horses to plow land and carry goods in carts or carriages (van Moorsel, 2010).

Use of the horse as a source of milk has been common in the grasslands since ancient times, and it was introduced into the Central Plains during the Qin (B.C. 221–207) and Han (B.C. 202–220 A.D.) Dynasties. In the Han Palace, special officials and craftsmen were responsible for producing horse milk wine for royal consumption. Later, the art of producing horse milk wines were propagated to more common folk. Because of its sweet taste, it was praised by ancient medical experts (Xie, 1991).

Other uses: During the Zhou Dynasty (B.C. 2146–1675), horses used for hunting were registered for the first time to be classified and called “Field horses”. Also, once a horse was judged as an inferior horse (“coward” horse), this horse would be used for odd jobs. These were generally low-quality horses that the government of the time did not care about. Generally, they were used for very hard work in harsh environments (Xie, 1991). Horses were also used in games and for entertainment. In central China, horses were first used for entertainment in the imperial court of the Han Dynasty (B.C. 202–220 A.D.) (van Moorsel, 2010) and this practice developed at an unprecedented rate during the Tang Dynasty (618–907 A.D.). Horseback acting, horse dancing and horse racing also appeared. Polo, which originated in

Tibet, flourished in the Tang Dynasty and had developed into a military sport during the Ming Dynasty (1368–1644 A.D.) (Xie, 1991).

Laws regarding horses: In the Qin Dynasty (B.C. 221–207), 《Salt and Iron Regulations – Criminal Law》 stated "Thieves for horses deserved to be sentenced to death…". In the Han Dynasty (B.C. 202–220 A.D.), 《Stable Regulations》 had strict punishment regulations for people hurting horses, but also had rules encouraging folk horse breeding by freeing horse breeders from paying taxes and limiting horse outflow. 《The Great Ming Laws – Stable husbandry regulations》 also had strict punishment rules for slaughtering horses inappropriately or without permission. The first horse administration system was formed during the Ming Dynasty (1368–1644 A.D.) (Qian, 1998).

Chinese Indigenous Horse Breeds

In addition to importing horses, there are many different breeds of horses indigenous to China. About 68% of the total number of indigenous horses in China are Mongolian horses, mainly located in the Inner Mongolia Autonomous Region, Northeast China, most of North China, and in part of Northwest China. Mongolian horses are well-known for their adaptability and endurance. Southwest horse breeds, formerly known as the Sichuan horses, are a type of small horse breed from the mountainous areas of Southwest China. They account for about 16% of the total number of horses in China. Their average height is about 114 cm (slightly over 11 hands), which is short and slender. This horse breed is divided into the Baise horse, Guizhou horse, Wenshan horse, Wumeng horse, Dali horse, Jianchang horse, Tengchong horse, and Zhongdian horse. Kazakh-type horses are mainly distributed in the north of Xinjiang, accounting for about 10% of the number of indigenous horses in China. The Kazakh horses are

relatively heavy. Tibetan-type horses are mainly distributed in Tibet region and areas adjacent to Tibet region. They are known by many names, including Back mountain horses, Xikang horses, Yushu horse, Guoluo horse, Rikeze horses, Naqu horse, Chnagdu horse, Gnazi horse, and Zhongdu horse. This type accounts for about 4% of the total number of indigenous horse breeds in China. Tibetan horses have a strong ability to adapt to harsh environments. Finally, the Hequ-type horses are larger and heavier, and are mainly distributed in Sichuan, Gansu and some areas adjacent to Qinghai Province. These horses account for about 2% of the total number of indigenous horse breeds in China (Qin et al., 2013).

Perspectives of the Modern Equine Industry of China

Since the foundation of the People's Republic of China in 1949, the horse industry in China began its transition into the modern equine industry. In the 1960s, breed improvements programs were implemented in order to foster new horse breeds. In the 1970s, remarkable achievements were accomplished with many new breeds which were developed and used in the agricultural areas of northwest China, north China and northeast China and pasturing areas in other parts of China. In the 1980s, these new horse breeds were examined and accepted or approved by the government. Unfortunately, management and supervision of the program eventually decreased, resulting in the loss of some of the new horse breeds. Approximately 30 years ago, the Chinese equine industry was nearly non-existent (Vorgers, 2017). However, in the 1990s, increasing demand for racing, riding and equestrian sports brought about changes in the functions of horses. In 1990, commercial horse races were held for the first time. Breeding programs were rebuilt, and newer, more modern breeding techniques were implemented (van Moorsel, 2010).

In response to market demands, horses are no longer merely used for traditional purposes. A 1500% increase in the number of horse clubs was seen between 2010 and 2017, and today the country has 1802 horse clubs[5]. Wang (2005) suggested that the Chinese equestrian industry has the potential to develop 15 disciplines, including racing, riding, breeding, polo, circus, movie horse industry, horse-riding police, horse culture education, pony industry, horse supporting industry, products horse industry and drafts horses. Xinjiang is the main horse-producing area in China, which had 750,000 horses including 350,000 mares as of 1999. In Xinjiang, horse products such as conjugated estrogens, pregnant mare serum gonadotropin (PMSG), refined horse fat, horse meat, and horse milk have developed rapidly (Yao et al., 2007).

Since 2009, the equestrian use of horses has also increased. Horses have been used for both professional and amateur purposes. Competing in show jumping and other equestrian sports has become a primary goal for many in the Chinese horse industry (van Moorsel, 2010). It seems likely this trend will continue to develop to more and more resemble the Western European way of using horses (Mang, 2009). Whilst the Chinese horse industry is growing rapidly in size, other aspects in this new industry have not yet developed to match international standards (Vorgers, 2017).

Summary

This review of literature gave an overview of horse use in ancient and modern times of China. Throughout over 6000 years of history in China, peer-reviewed publications and open-access literature provide only a small portion of documents available. Historical records, from

[5] Horsemanship Magazine. 2018. Annual report: state of Chinese equestrian industry development. Accessed April 2, 2019, https://pmu.cn/13035/

which interrupted knowledge about horse use could be found, could give us the opportunity to learn more about horse use in China's history. They also allow for consideration on possible ways of combining traditional horse use and modern horse science and technology to guide and shape the redeveloping Chinese horse industry. However, the rapid development of the Chinese horse industry has resulted in many challenges relative to horse use and welfare during a time when animal welfare is a hot topic around the world. The purpose of this study was to understand the present profile of horse use in horse clubs in China from the perspective of horse welfare, and is expected to provide a reference for the Chinese horse industry and people to begin cooperating to move the Chinese horse industry into a world market.

Chapter 3. Methodology

Design

This study used a survey design involving an online questionnaire that was constructed as a respondent friendly questionnaire that would be easy to understand and relatively short (Dillman et al., 2014). Questions were developed with consideration of information needed to establish a baseline of horse use and welfare in China. The questionnaire was composed of 3 sections and a total of 29 questions. Demographics included information on club history and management as well as horses owned by the club. Other sections included horse use and management and feeding practices.

Instrument Reliability and Validity

When selecting a survey instrument for research, there are some important factors that should influence the decision. The two most important factors in selecting an instrument are that the instrument measures the variable of interest and that it is reliable and valid. Reliability refers to the extent that the instrument yields the same results over multiple trials. Validity refers to the extent that the instrument measures what it was designed to measure. Validity and reliability of this instrument were established by submitting the survey to a test group of three Chinese horse clubs. Revisions to the survey were made based on responses and feedback from each club. Pre-test results showed that the time needed for finishing this questionnaire was between 20 to 40 min for a horse club manager.

Participant Selection and Data Collection

Based on cultural differences and issues with translation, the survey was not simply delivered to Chinese horse clubs. Participants were initially selected from horse clubs that the primary investigator could reach by phone, email, WeChat, or through personal contacts so that questions about the survey could be answered and the survey completed as thoroughly as possible. Horse clubs were also approached by contacts familiar to the primary investigator to gather still more responses. As such, the total number of horse clubs that received the survey information is not known.

The instrument was administered using SurveyMonkey® from November of 2018 to January of 2019. Participants were allowed 8 wk to respond, and reminders were given every 2 wk to encourage response. Associates of the primary investigator who were in China were asked to approach horse clubs and encourage responses as well.

Data Evaluation

At the completion of the collection period, the data was downloaded into an Excel spreadsheet. Descriptive statistics were utilized to quantify and characterize the data within the categories of demographic, horse management and horse use information.

Chapter 4. Results and discussion

A total of 20 horse clubs reporting 1703 horses responded to the survey. A few responses to some questions were quite confusing, likely based on translation issues. Responses considered inappropriate for the question or those that simply did not make sense were not used in the evaluation of data.

1. Demographics

1.1 Number and location of respondents

Geographically, China can be divided into 7 regions (Figure 1), which are Northeast, North, Northwest, East, Central, South, and Southwest China. Northeast includes Heilongjiang, Jilin and Liaoning. North includes Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia. Northwest includes Shannxi, Gansu, Qinghai, Ningxia, and Xinjiang. East includes Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, and Taiwan. Central includes Henan, Hubei, and Hunan. South includes Guangdong, Guangxi, Hainan, Hongkong, and Macau. Southwest includes Chongqing, Guizhou, Sichuan, Yunnan, and Tibet (Bai et al., 2015).

At least one response was submitted from each of the 7 regions. Of the 20 horse clubs that responded, 6 were from East China, 5 from North China, 3 from Northwest China, 2 from South China, one from Central China, one from Southwest China, and one from Northeast China. One did not respond this question (Figure 2). While it initially may appear important that the majority of responses came from East and North China, it must be noted that the relationship between the author and some of the horse clubs contacted for participation in the

study likely biased the distribution of responses. As such, more horse clubs from East China, the author's home province, responded to the survey.

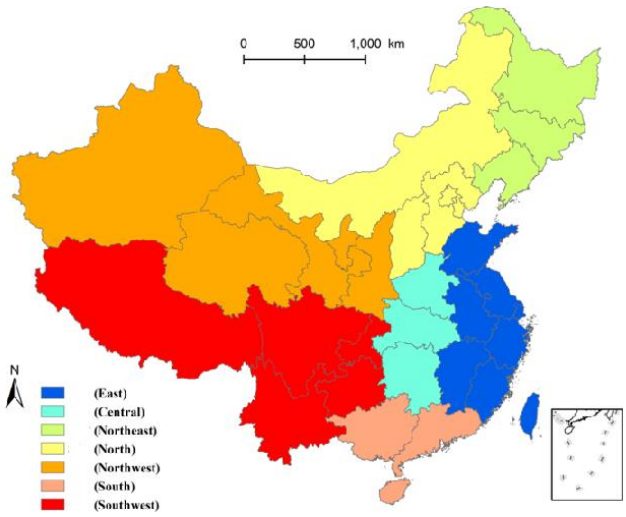

Figure 1. Seven geographical regions of China used to record the location of 20 horse clubs that responded to a survey on horse use and management.

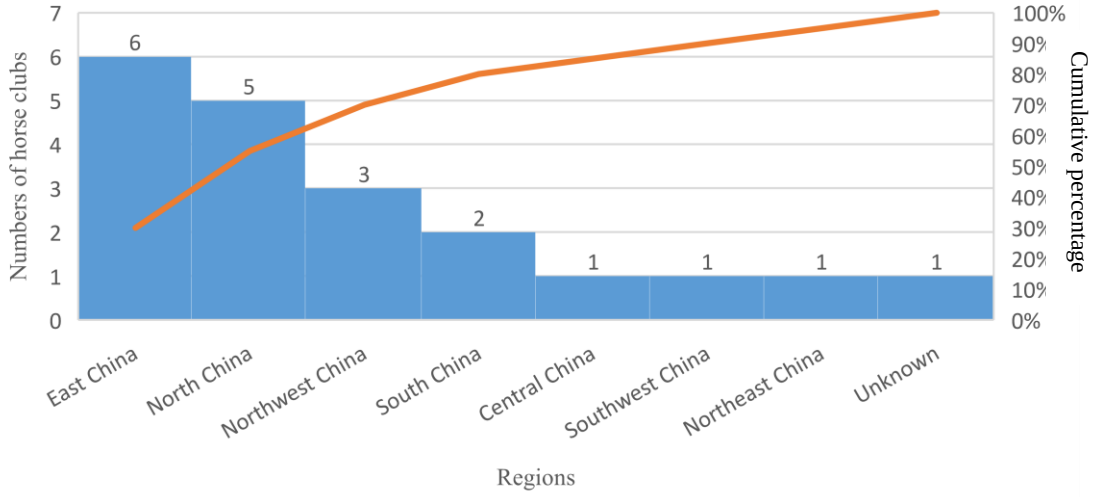

Figure 2. The number and location of 20 respondents to a survey on horse use and management in China.

In 2010, there were approximately 300 horse clubs in China (Li, 2013). However, a recent survey evaluating 2016-2018 reported that there were 1802 horse clubs in China by July

31, 2018, as compared to 907 in 2016 and 1452 in 2017[6]. In 2016, the distribution of horse clubs of China was aligned by their scale in descending order of East China, North China, Northeast China, South China, Northwest China and Southwest China (Qiao, 2016). In 2018, three of the seven regions held most of the horse clubs (61.80%): East China (n=599; 33.2%), North China (n=531; 29.5%), and West central China (n=368; 20.4%)[7]. In our survey, 6 horse clubs (30.0%) were from East China and 5 (25.0%) were from North China. These included 55.0% of the total respondents (Figure 2), which is similar to previously published survey data.

In China, public numbers (WeChat) and websites could be among the most important ways of spreading information about a business. Among the 20 respondents, only 7 had their own website or WeChat public number (Table 1). In a previously published survey[8], 74.1% of 109 selected horse clubs had their own WeChat public number, and 58.9% of another 86 selected horse clubs had their own websites. In this survey, only 35% of respondents (n=7 of 20) had a WeChat public number or website. On one hand, the short history of horse the clubs surveyed may be a reason for this lack. On the other hand, a lack of marketing awareness and the importance of publicity and promotion measures may not encourage the clubs to invest for business promotion (Shen et al., 2015). In view of the low cost, fast dissemination and wide coverage of network propaganda, mass media tools should be fully utilized to promote the horse clubs (Yan et al., 2011).

[6] Horsemanship Magazine. 2018. Annual report: state of Chinese equestrian industry development. Accessed April 2, 2019, https://pmu.cn/13035/
[7] Horsemanship Magazine, 2018.
[8] Horsemanship Magazine, 2018.

Table 1. Use of WeChat public numbers or websites in Chinese horse clubs (n=20) in response to a survey on horse use and management.

Style	North	South	East	Central	South West	North West	North East
Public Number	0	1	1	0	0	3	0
Website*	1*	0	1*	0	0	0	0

*: http://www.yulonghorse.com.cn/; http://www.yinglunqishi.com/exper.asp

1.2 Date of establishment of Chinese horse clubs

All of the horse clubs that responded were established between 2002 and 2018. Of the 20, 13 (65%) were founded between 2011 and 2018 (Figure 3). Since 1985, when the first horse club, Daoxiang Lake Rural Equestrian club was set up in Beijing (Yan et al., 2011), the number of horse clubs has grown. The appearance of a spike in the number of horse clubs established in 2012 and 2015 in the current data do not necessarily indicate two years with the most establishment of horse clubs in China. As was acknowledged previously, the method of survey distribution and low response rate likely biased the data. However, even these responses imply rapid growth of the Chinese horse industry since 2010.

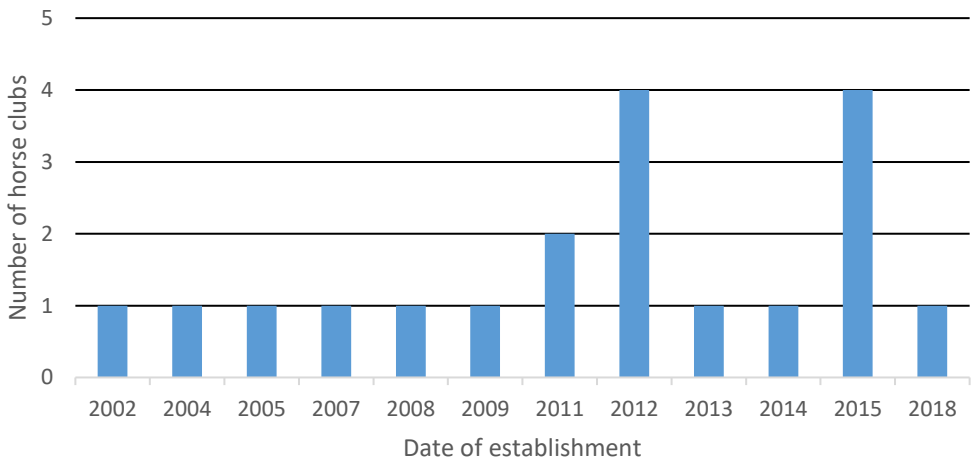

Figure 3. The date of establishment of 20 horse clubs in China

1.3 Number and age of horses in Chinese horse clubs

Of the 20 respondents, one did not respond to the question on the age of horses in the club. Twelve horse clubs indicated that they had no horses over 20 yrs of age, while one horse club only had horses under 15 yrs of age and another reported only having horses between 6–10 yrs of age. Two horse clubs had horses under 10 yrs of age. Horses under 15 yrs represented 84.6% of the total number of horses reported (Table 2).

Table 2. The number of horses and ages in 20 horse clubs responding to a survey on horse use and management in China.

Age	<5 years	6-10 years	11-15years	16-20 years	>20 years
Number	506	477	466	234	30
Percentage	29.54	27.85	27.20	13.66	1.75

In northern Britain, the age structure of a population of horses showed that the most numerous horses were between 5-9 years old, the second largest group was 0-4 years old, and the third largest group was 10-14 years old. Horses from 0-15 years of age constituted the majority of horses in Northern Britain (Mellor et al., 1999). In this survey, nearly 85% of the horses from 20 horse clubs in China were from 0-15 years old. Age could be one of many important factors affecting a horse performance. Findings from race records of Thoroughbreds and Standardbreds suggested that ages from 2 to 5 years had a significant impact on total earnings (Cheetham et al., 2010). Other research evaluating the effect age on show jumping success indicated that the best results were in horses between the ages of 12-13 years, after which performance declined (Miroslav, et al, 2006). In this survey, horse clubs were not asked which ages of horses were involved in which activities, so any discussion regarding the age of horses relative to their performance would be purely speculation.

In developed countries, the proportion of aged horses within the equine population appears to be increasing, due in part to improved health care and nutrition plus a change in the public perception and expectations regarding ageing horses (Ralston and Harris, 2013). Demographic old age has been defined as the point at which there is only 25% survivorship of the population at or above that specific age. One United Kingdom study found this age to be 15 years. The equine population was relatively stable until horses reached 15 years of age, after which there was a steady decline in numbers until there were very few horses over 35 years of age (Mellor et al., 1999). In the current survey, about 15.4% of 1713 horses were over 15 years old (Table 2), which corresponds to a relatively short history of the 20 respondents.

All 20 respondents answered the question: "How old is the oldest horse in use in your club?" Two clubs established in 2012 reported their oldest horse was 18 years old. One club did not list a year of establishment. It appears that the longer a horse club had been in existence, the older the horses it had (Figure 4). Again, however, the low response rate must be taken into consideration before any solid conclusions are drawn.

In the current survey, the ages of the oldest horses ranged from 10 to 25 years. A survey conducted in 1999 suggested that in Scotland and northern England, the oldest horse could be 37 years old (Mellor et al., 1999). Another study showed that in Australia, aged horses constituted a large subgroup of the Australian horse population; horses aged 15 years or greater represented one-third of the total horses owned in the population sample. The median age of the horses was 20.7 years (range 15–44 years) (Mcgowan et al., 2010).

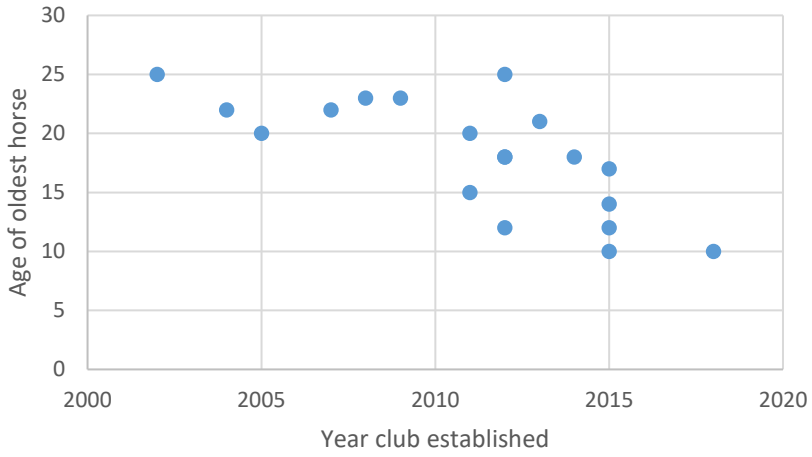

Figure 4. The age of the oldest horse in use in 20 different horse clubs in China by the year of horse club establishment.

1.4 Paddocks and turnout space

One club did not respond to the question regarding paddocks and turnout space. Four horse clubs indicated that they had no paddocks for turnout. Five horse clubs reported paddocks with grass, with sizes ranging from 50-10000 square meters. The final 15 clubs had paddocks without grass, ranging from 200-30000 square meters (Table 3). Some horse clubs (n=4) had both paddocks with and without grass. Research investigating the effect of exercise (no exercise/daily exercise) and paddock size (small: 150m^2, medium: 300m^2, and large: 450m^2) on horse behavior, findings suggested that increasing paddock size increased time spent eating grass and decreased time spent standing passively (Jorgensen and Boe, 2007). It is commonly accepted that turnout space for free exercise is important to equine welfare; as such, those horse clubs with little or no paddocks or turnout space may have to address equine welfare in other ways.

Table 3. Description of paddocks with or without grass in 20 horse clubs in China

	Paddocks with grass	Paddocks without grass
Number of horse clubs*	5	15
Range (m^2)	50-10000	200-30000
Range (acres)	0.08-15	0.30-45

*The total number of clubs reported includes those with both paddocks with and without grass

1.5 Turn out time: hours/day and days/week

Two horse clubs did not respond to questions regarding turn out time available for horses. One respondent answered zero. Of the other 17 horse clubs, the average turn out time was 2.7 hr/d (Table 4) over an average of 5.5 d/wk.

Table 4. Turn out time in hours per day in 17 horse clubs in China responding to a survey on horse use and management

Turnout	Min	Max	Average
Hours per day	0	6	2.67
Days per week	0	7	5.53

Turn out benefits horses in many ways, but size of the turnout space is important. Larger turnout spaces may reduce stress responses during short periods of group turnout (Suagee-Bedore et al., 2017), and even "weekend" turnout could maintain bone mineral content (Spooner et al, 2014). Large pasture turnout helped maintain bone strength and exercise fitness ability for horses (Graham et al., 2013). Additionally, the behavior of stabled horses was more relaxed when turnout was allowed in addition to training. Behavior during training was also more relaxed, and horse's willingness to perform was not negatively affected by turnout (Werhahn et al., 2011). In the current survey, the response rate for the question regarding turnout time each day was 18/20 (17/20 with useable data). The maximum and minimum amount of turnout hours in a day were 6 hr and 0 hr, respectively, with an average of 2.7 h (Table 4). For the question of how many days of turnout each horse received in a week, the maximum and minimum of turnout days in a week were 7 d and 0 d, respectively, with an average of 5.5 d. Based on current management practices in the United States, it can be assumed that most of horse clubs responding to this survey used turnout effectively to manage their horses. The concern rests with those that reported having no turnout space at all.

It is difficult to say how much turnout is best. For example, in a study on the relationship between time spent in turnout and behavior during turnout in horses, results showed that horses turned out for 2 hr/wk were more likely to trot, canter, and buck during turnout than those turned out for 12hr/wk (Chaya et al., 2006). Another study demonstrated that pasture raising or 12-h daily turnout was beneficial to maintaining and increasing bone mineral content in weanling Arabian horses (Bell et al., 2001). In the United Kingdom, turnout time per week for dressage horses when grouping all the competition levels together showed that 2% of dressage horses had no turnout while 9% had over 90 h a week and 3% were out "all the time". Most horses were turned out from 15 to 60 hr/wk (Walters et al., 2008). No data was collected on behavior of these horses. Another survey showed that 58% of horses in Great Britain were turned out 24 hr/d (Mellor et al., 2001). For turnout time, many people turn out 24 hr/d during the summer. However, over winter the vast majority were stabled for at least part of the day (Hotchkiss et al., 2007).

1.6 Imported horse breeds and origins

The top 5 imported horse breeds with most distribution in horse clubs were warmblood (WB), Thoroughbred (TB), Arabian, Friesian and Akhal Teke (Table 5). According to Horsemanship Magazine (2018[9]), the top 5 imported horse breeds in China from 2015 to 2017 did not include Arabians. Also, the Miniature and Mongolian horse breeds, which are popular in China, were not reported by the 20 respondents of the current survey. However, according to Horsemanship Magazine (2018[10]; Table 6), WB and TB horses are likely the most popular imported horse breeds in China. This is not surprising as WB have been selectively bred for conformational traits correlated with good gait score for dressage, and TB have historically

[9] Horsemanship Magazine, 2018. https://pmu.cn/13035/
[10] Horsemanship Magazine, 2018. https://pmu.cn/13035/

been bred for their ability to gallop and jump at speed (Walters, et al, 2008), which is what the Chinese horse industry is looking for.

For the origins of imported horses, the top 5 nationalities from 2015 to 2017 included Netherland, New Zealand, Australia, Mongolia, Kazakhstan, Russia and Germany[11] (Table 7). In the current survey, horses were imported from most of the same countries, except that no horses were reportedly imported from Mongolia.

Table 5. The most commonly imported horse breeds in China, and their origins

Horse	Number of clubs	Percentage	Origin
WB	12	30.00	Netherland, Belgium
TB	7	17.50	Australia, Belgium, British, Irish
Arabian	6	15.00	Arabian
Friesian	3	7.50	Netherland
Akhal Teke	3	7.50	Arabian, Kazakhstan
Shetland	2	5.00	Netherland
Selle Francais	1	2.50	France
Orloff	1	2.50	Russia
Hannover	1	2.50	Germany
Andalusian	1	2.50	Lusitano
QH	1	2.50	America
Lusitano	1	2.50	Belgium
Budenny	1	2.50	Russia

Table 6. The top 5 imported horse breeds in 2015, 2016 and 2017 in horse clubs of China.[1]

	2015		**2016**		**2017**	
Breed	Head	*(%)*	Head	*(%)*	Head	*(%)*
WB	500	21.74	500	27.78	450	25.77
TB	500	21.74	480	26.67	420	17.61
Miniature	360	15.65	220	12.22	240	14.72
Akhal Teke	180	7.83	60	3.33	-	-
Mongolian	130	5.65	210	11.67	60	3.68
Friesian	-	-	-	-	40	2.45
Total	2300		1940		1780	

[1]Total number of horses represents all imported horses in the given year, not the sum of the top 5 breeds imported.

[11] Horsemanship Magazine, 2018. https://pmu.cn/13035/

Table 7. The origins of imported horses from 2015 to 2017[1],[12]

	2015		2016		2017	
Nationality	N	%	N	%	N	%
Netherland	800	34.8	700	38.9	480	30.1
New Zealand	300	13.0	300	16.7	110	6.8
Australia	230	10.0	210	11.7	210	12.9
Mongolia	180	7.8	190	10.6	150	9.2
Kazakhstan	170	7.4	-	-	-	-
Russia	-	-	80	4.4	-	-
Germany	-	-	-	-	180	11.0
Total[1]	2300		1800		1630	

[1]Total number of horses imported is larger than sum of reported horses imported in the table as only the top five countries are specifically noted.

1.7 Chinese horse breeds in horse clubs

Three horse clubs did not respond to a question regarding indigenous horse breeds. Two responded with no, which meant that they did not have Chinese horse breeds in their clubs. Mongolian and Yili horses were the two most commonly reported domestic breeds (Table 8). Domesticate horse breeds occupy about 25% of all the horse breeds of horse clubs in China, compared to 22% of TB and 18% of WB, mainly including Akhal Teke, Debao Miniature, Mongolian, Yili, Sanhe and dwarf horses[13].

Table 8. Distribution of Chinese horse breeds in 20 horse clubs responding to a survey on horse use and management

Horse breeds	Number of horse clubs	Percentage (%)
Mongolian	5	33.33
Yili	4	26.67
Sanhe	1	6.67
Baise pony	1	6.67
Xinan	1	6.67
Debao Pony (Miniature)	1	6.67
Dongbei	1	6.67
Yunnan	1	6.67
Total	15	100

[12] Horsemanship Magazine, 2018. https://pmu.cn/13035/
[13] Horsemanship Magazine, 2018. https://pmu.cn/13035/

In China, the selection of horses traditionally depends on whether competition horses can bear hardships, bear more weight and go further. In foreign countries, especially in Europe, the performance of horses is highly valued. Horses with good conformation, jumping ability and beautiful gaits are highly sought after. Different breeding objectives produce horses with different physical appearances and athletic ability. Most of the domestic racing horses for training programs are retired horses donated by Hong Kong and Macao Jockey Clubs (Peng et al., 2010).

Horse breed resources in China are very abundant. There are 33 kinds of horse breeds listed in the book of China Horse and Donkey Breed Record. According to the origin of varieties, breeding degree and historical development, Chinese horse breeds can be divided into 3 types: indigenous varieties, bred varieties and introduced varieties. The indigenous breeds include Mongolian, Southwestern, Kazakhstan, Hequ and Tibet horse breeds. The bred breeds include Sanhe (three rivers), Yili and Shandan horses (Cheng et al., 2009). In the current survey, Mongolian, Yili and Sanhe horse breeds were top three Chinese indigenous horse breeds in numbers, implying their value in the Chinese horse industry.

1.8 Goals for use of horses

A total of 2381 horses were pointed out for their use in this survey. Some horses may have been counted more than once as some horses may be used for multiple functions. Two horse clubs claimed that they used horses for museum exhibition and pulling, respectively. The top 5 growing uses of horses in horse clubs in China will likely be a teaching horses in the British Horsemanship System (BHS), or as mounts for Western equestrian events, as polo ponies, for racing, and for endurance[14]. However, the results of the current survey suggested

[14] Horsemanship Magazine, 2018. https://pmu.cn/13035/

that horses were used for recreation (20.45%), breeding (17.46%), teaching (15.46%), dressage (15.25%) and jumping (10.29%). Use for endurance events was only 1.6%, and for barrel racing (Western equestrian events) was only 1.2% (Figure 5). In the United States in 1998, the primary use of horses was pleasure/recreation (66.0%), farming/ranching (15.2%), showing/competition (6.5%), breeding (6.0%), other (3.6%) and racing (1.9%). By 2003, this had changed to recreation (42%), showing/competition (29%), other (19%), and racing (9%) (Kilby, 2007). As of 2015, the highest percentage of operations (47.2%) used equids for pleasure, followed by farm/ranch work (25.0%). Similar percentages of operations indicated a primary use of horses for breeding or showing/competition (8.5% and 8.1%, respectively) (USDA, 2015). In Great Britain, a survey of horse owners showed that 56.7% of horses were used for pleasure (e.g. hacking, small competitions, riding club, riding school), 12.8% as retired horses, and 11.7% for performance (e.g. racehorse, eventing, endurance). It is obvious that horse use in the United States and Great Britain is primarily for recreation and farm/ranch work. This is different from the distribution of horses in the current survey. Considering differences in social and economic environments, and the fact that horses in this survey were all from horse clubs (not individually owned), it cannot be assumed that many horse clubs of China will transform their club management to prioritize recreation or farm/ranch in near future despite the fact that the horse industry both in the United States and Great Britain have served as a model for the world.

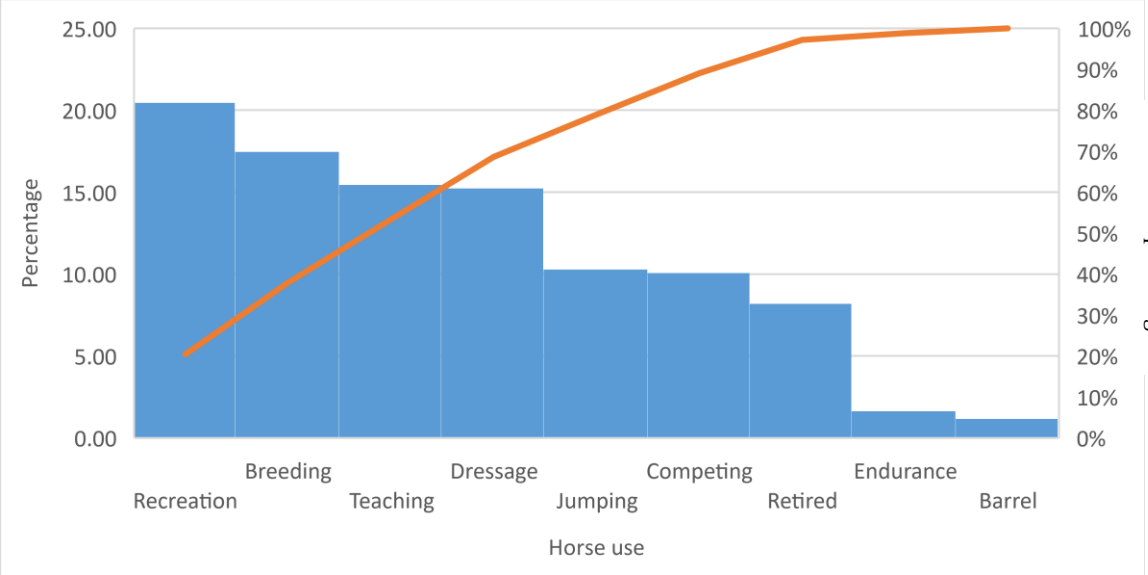

Figure 5. The use of horses in 20 horse clubs in China. The orange line represents the cumulative percentages of number of respondents.

2. Horse management

2.1 Skills needed by horse clubs

Equestrian clubs of China have been facing different levels of talent shortage in various positions such as coaches (to train riders and people), trainees, veterinarians, farriers, club managers and stable managers (Yan et al., 2011). In the current survey, 7 skills were listed for respondents to choose from to indicate the most needed. Results showed that all 7 skills were chosen at least once, however, veterinary, farrier and nutritionist were the top three (Figure 6). According to Horsemanship Magazine (2008[15]), coaches, grooms, and veterinarians are in great demand. In China, there are no education systems like those of western universities for training Doctors of Veterinary Medicine, and equine science education is also in its infancy. Currently, students can earn a bachelor's degree in Veterinary Medicine, but it consists almost completely of classroom education with little to no hands-on experience. Those skills are later learned as on-the-job training if, or when, the graduate begins to work with a more experienced

[15] Horsemanship Magazine, 2018. https://pmu.cn/13035/

veterinarian. Most likely the scenario of lacking talents in equine disciplines will continue to exist for a long time.

The questionnaire also allowed horse clubs to list and explain other skills needed. One horse club reported needing people with skills in horse training, stable management and nutrition, but indicated that they would like to see all those skills in one person. This suggests that they want people trained or experienced in equine science, however, most horse clubs likely would attempt to hire as few people as possible in order to save money.

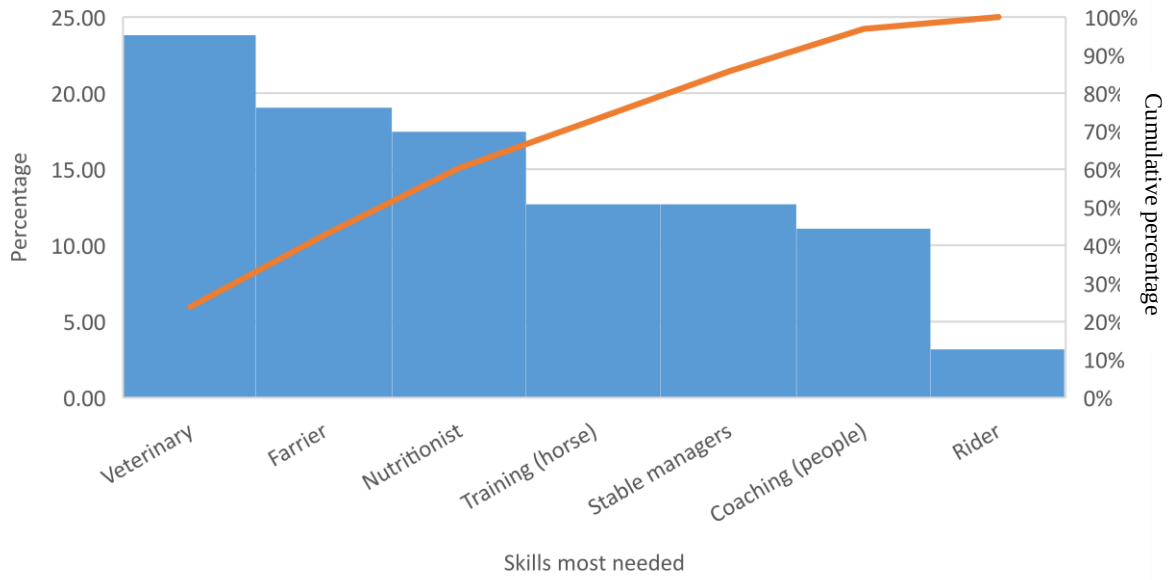

Figure 6. Skills most needed in 20 horse clubs in China. The orange line represents the cumulative percentages of number of respondents.

2.2 Employing veterinarians, farriers and dentists

Six clubs did not respond to the question regarding use of a farrier, while one club did not respond about employing veterinarians. Ten clubs did not respond regarding dentists, which is unsurprising given that this is not commonly thought of as an independent skill set – it is typically associated with a veterinarian. Two clubs employed veterinarians both full time and part time, one of which also employed farriers both full time and part time. When taken into

consideration together for three types of employees, full time and part time employees were employed equally. However, for dentists, horse clubs were more likely to employ them part time if they denoted that as a separate skill (Table 9). In the current survey, 60% of responding horse clubs employed full time veterinarians. This differs from other published lay research, where full time veterinarians were only used in 29% of horse clubs of China.[16]

Table 9. Employment of veterinarians, farriers and dentists in 20 horse clubs in China

	Employees					
	Veterinary		Farrier		Dentist	
	F	P	F	P	F	P
Number of responses	12	9	9	6	2	8
Percentage	0.60	0.45	0.45	0.35	0.10	0.40
Total full time	23		Total part time		23	

Note: F: full time; P: part time.

2.3 Riders with certificates or degrees associated with equine science

Two clubs from East China and two clubs from Northeast China responded to this question with zero, indicating they had no riders holding certificates or diplomas associated with equine science. One club from Southwest China said 100% of its riders held such certificates or degrees, which is remarkable. In total, 80% (n=16/20 clubs) of clubs that had riders with certificates or degrees associated with equine science (Table 10). However, the average education level of coaches in some horse clubs in Shandong and Jiangsu Provinces was very low; 92.1% of coaches had only graduated from middle school. The limited education of some of these employees could hold back the development of their local horse industry (An et al., 2012).

[16] Horsemanship Magazine, 2018. https://pmu.cn/13035/

Table 10. Riders with certificate or degrees associated with equine science in 20 horse clubs in China (%)

Max	Min	Average	<20%	20%-40%	40%-60%	60%-80%	80%-100%
			Number of clubs				
100	0	38.75%	3	2	4	4	3

2.4 Foreign coach employment in the previous year

Nearly 60% of the foreign coaches were employed for a period of 6-12 months or over 12 months (Table 11). While the Netherlands was the number one country China imported the most horses from between 2015 and 2017[17], according to the current survey most coaches were from France (Figure 7). The number of coaches from the Netherlands was the second. This disparity was most likely an artifact of the sampling process from the limited response size of the current survey. However, it should be noted that the French equestrian association has been dedicating to spreading the Gallop system in China in past decades.

Table 11. Foreign coach employment in 20 horse clubs in China in the previous year

Time	<3 mon	3-6 mon	6-12 mon	>12 mon
Number of coaches	24	16	13	43
Percentage (%)	25.00	16.67	13.54	44.79

[17] Horsemanship Magazine, 2018. https://pmu.cn/13035/

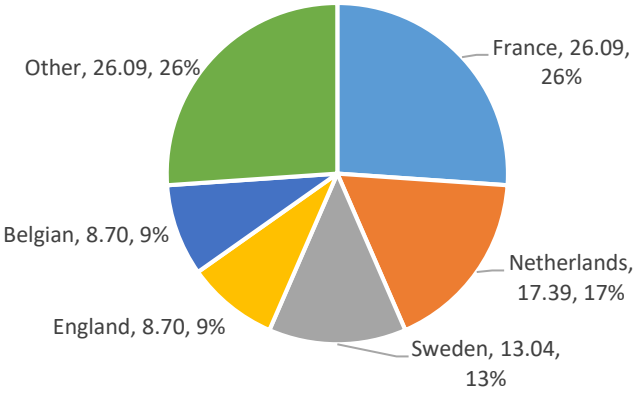

Figure 7. The nationality of foreign coaches employed in 20 horse clubs in China

2.5 Foreign people's duties

No foreign people were employed for polo or dental work (Figure 8). Foreign coaches were mainly responsible for teaching riding (42.9%), dressage (21.4%), nutrition (17.9%) and farrier skills (7.1%). These top 4 duties handled by foreign people were closely related to the most needed skills noted previously (Figure 6), and suggests that education and training in China by Chinese equine industry professionals is not ready to handle the task directly.

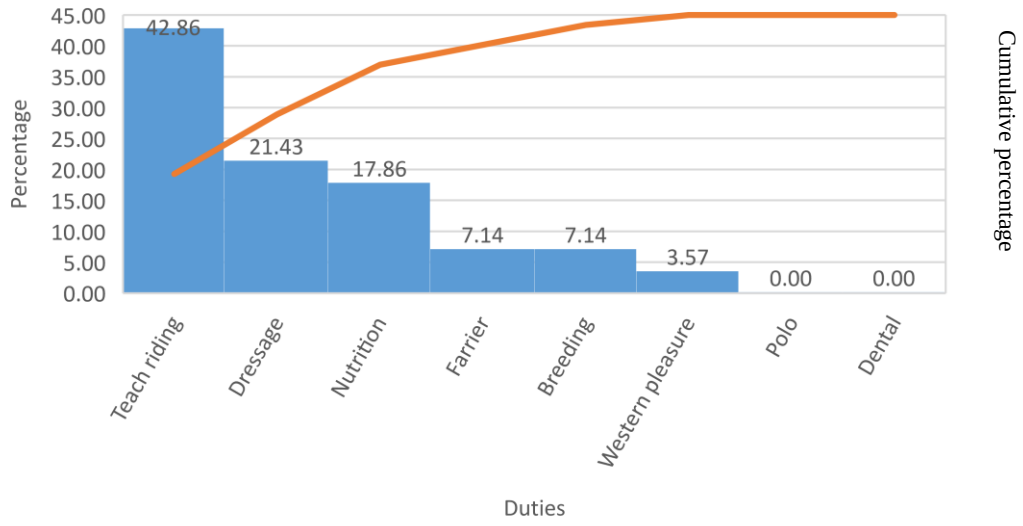

Figure 8. The duties of foreign people in 20 horse clubs in China. The orange line represents the cumulative percentages of number of respondents.

2.6 Number of events horse clubs participate in during a typical year

In China, equestrian events mainly include jumping, three-day events, dressage, racing, endurance, polo, juvenile competition events and others which happen around the country from May to November of a year[18]. One club responded with an ambiguous "hard to say", while three clubs gave a range as a response to the question regarding participation in equine events. The results from 19 respondents showed that most horse clubs took part in some events during the year, but the activity seemed fairly low. In the United Kingdom, the annual competition frequencies of all dressage horses were 6-10 times/year (31%) and 11-15 times/ year (24%) (Walters, et al, 2008). However, for the 20 horse clubs in the current survey, most clubs reported attending 0-5 events/yr (52.6%), suggesting a low efficiency of using horses for these events in those clubs (Table 12). This may have been due to the type of business the respondents were involved in (Figure 5).

Table 12. The number of events 20 Chinese horse clubs took part in during a typical year

Number of events/yr	Number of clubs	Percentage
0-5	10	52.6%
6-10 times	4	21.1%
>10	5	26.3%

2.7 Number of customers served in a typical year

Fourteen horse clubs provided membership service, which means memberships had to be purchased in order to utilize the horses at the club. Twelve clubs offered services for visitors, some in conjunction with membership. Five horse clubs were not open to the public. One club said that they had 100,000 visitors in a year. This number was culled from the data set for being

[18] Horsemanship Magazine, 2018. https://pmu.cn/13035/

an extreme outlier. The average number of memberships was 303 people[19], higher than the average value 260 from our survey (Table 13).

Table 13. The number of customers 19 horse clubs in China served in a typical year.

	Number of clubs	Max	Min	Mean
Number of memberships	14	1000	40	260
Number of visitors	12	2000	200	667

2.8 Major equine health problems in horse clubs in China

This question was designed to give five options from which respondents could select one or more. They included injury (cuts, kicks, strains, sprains, etc.), hoof issues (abscess, cracked hooves, abnormal growth/shape, etc.), colic, horse too thin, and other. No club offered another option beyond the four specific ones set up with the question. Results showed that the major health problems the 20 respondents experienced were hoof issues (33%), followed by injury (31%), colic (23%) and horses being too thin (13%) (Figure 9). In the United States, reports have documented that the top three equine health conditions were digestive/diet-related problems such as colic, injury/wounds/trauma and leg/hoof problems (Kilby, 2007; USDA, 1998).

[19] Horsemanship Magazine, 2018. https://pmu.cn/13035/

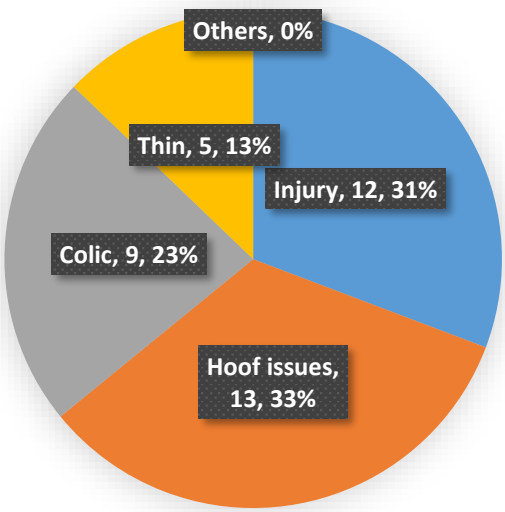

Figure 9. Major equine health problems experienced by 20 horse clubs in China

In Yi Ning County of Xinjiang Province located in northwest region of China, an investigation into the major health problems of Yili horses showed that the incidence of infectious diseases (strangles, equine influenza and tetanus) and parasites infection (roundworm disease, acariasis, gastric nematode disease and pyriform disease) was 20.2%; the incidence of surgical and obstetrical diseases (abdominal wall hernia, bursitis, trauma, joint sprain, mumps, rheumatism, placenta retention, endometritis, vaginal prolapse, equine infertility, flexor tendinitis, bite) was 38.4%; and the incidence of medical diseases (bowel swelling, intestinal metastasis, intestinal constipation, intestinal spasm, gastric dilatation, cold, bronchitis, rhinitis, gastrointestinal rupture, heatstroke, pneumonia, urolithiasis) was 41.4%. Improper feeding, management, and use of horses were the principle reasons given for the diseases affecting Yili horses (Su et al., 2014). Another investigation on epidemics of various diseases in horse clubs of Henan Province located in central region of China showed that the incidence of infectious diseases and parasites infection, surgical and obstetrical diseases, and medical diseases were 11.5%, 40.2% and 44.8%, respectively. The main reasons given for the incidence of these conditions were improper feeding and management, overuse for riding for

recreation, and poor of adaptability of introduced TB horses, half TB horses, and some hybrid horses (Zhang et al., 2008).

The current survey did not ask for the causes of health problems; however, the high incidence of hoof issues, injury and colic implied that the practice of feeding and stable management, disease prevention and horse use may be less than optimal.

2.9 Horse feeds

Nutrition is an important aspect of health in all species. In horses, a diet that is formulated improperly can contribute to a number of disease conditions, including colic, orthopedic problems, and obesity. In addition, formulating a properly balanced ration for a horse is more difficult than for other species, because it must be developed from multiple components (e.g., forage and one or more concentrates), and it must take into account the activity level, life stage of the animal, and individual variation, as in other species (Hoffman et al., 2009).

Eighteen respondents stated that they fed horses hay, one of which fed their horses both hay and pasture (Table 14). Although there were 16 responses to the question of how much forage was fed to each horse daily, three of the responses were misleading by saying things like “It depends, or free take”. Those responses were dropped from consideration. A survey in New England suggested that all horse owners reported feeding hay, with the majority feeding grass hay (Hoffman et al., 2009). Another survey in Great Britain showed that the majority of horses had exposure to grass (i.e. grazing) during the year, and that hay was the most commonly fed forage with 69.3% of horses having access (Hotchkiss, et al. 2007). A survey of a global population of horse owners suggested that more than 70% of respondents stated that their horses had some access to pasture (Murray et al., 2015). In the current survey, there was only one response stating horses had access to pasture.

The amount of forage required for each horse varies according to their work load, breed, health, and concentrate supplementation. A horse's work load can be divided into four categories: maintenance (no work), light, medium, and heavy work. Horses have evolved to [20]consume small amounts of feed several times a day, rather than large amounts of feed once or twice a day. Anatomically, the equine digestive tract is designed to accommodate small meals over the course of 24 hr. The stomach is relatively small[21].

Therefore, the forage volume fed for each horse (kg/d) and the frequency of feeding for each horse (times/d) in horse clubs surveyed were acceptable based on accepted practices.

Table 14. Forage feeds and feeding frequency for horses in 20 horse clubs in China

Type	Forage volume for each horse (kg/d)		Frequency of feeding (times/head/d)		
	Max	Min	Max	Min	Mean
y	25	2	6	2	4

2.10 Concentrate (grain mix) uses

Three questions involved the feeding of concentrates (grain mixes). Responses received were mixed. Nine respondents answered all three questions. One responded with "no", which meant they did not use concentrates for horses. Two respondents answered the question on feeding frequency with a "1" or "1 to 2", which meant once a day, or once or twice a day, respectively. One respondent did not provide the concentrate type but did indicate "how much" and "how often". One respondent just said concentrate was used for feeding the racing horses and did not say anything about "how much" and "how often". Six respondents didn't answer the inquiry. Ultimately, data from nine respondents were evaluated. It may be that those horse clubs that did not give a clear answer to the questions (11/20) do not feed their horses

[20] https://www.triplecrownfeed.com/forage-requirements/
[21] Laurie, L. Equine feeding management: The how & when of feeding horses. http://www2.ca.uky.edu/agcomm/pubs/asc/asc143/asc143.pdf

concentrates. If that is the case, then this data would not be in line with previously published surveys. A study of horse owners in New England revealed that most horse owners (96%) reported feeding a concentrate in addition to hay (Hoffman et al., 2009). Another survey to investigate the knowledge and confidence and perceptions and practices of equine nutrition by a global population of horse owners or caretakers registered in a free online course on equine nutrition suggested that concentrates were fed by the majority (87%) (Murray et al., 2015).

Concentrates should be fed at as low a level as possible with forage making up the major portion of the diet. Concentrates should be fed at less than 50% of the diet with a 20–30% concentrate level more desirable. This would mean that a 1000 lb mature horse being fed at 2% of its body weight, or 20 lbs of feed per day, would receive approximately 14-16 lbs of hay and 4–6 lbs of concentrate (Patricia et al., 2000[22]). For horses used for heavy work, for pleasure, or for racing, a higher proportion of concentrates should be fed (Ensminger, 1990). In the current survey, the majority of horses were used for recreation (20.5%), breeding (17.5%), teaching (15.5%), dressage (15.3%) and jumping (10.3%) (Figure 7). The maximum concentrates for a horse each day was 6 kg, and feeding frequency of concentrates was 2-3 times a day (Table 15). Therefore, concentrates feeding pattern was also acceptable in 20 horse clubs in China.

[22] Patricia, E. & Scott, M. (2000). Equine nutrition: concentrates. https://extension.usu.edu/equine/files-ou/Equine-Nutrition-Concentrates.pdf

Table 15. Concentrate types and feeding frequency for horses in 20 horse clubs in China

Concentrate type	Amount per horse/d	Frequency per horse/d
Processed feeds	2-6 kg	2
Cereal	It depends	2
Self-made	about 3 kg	3
Red Ram (brand)	It depends	3
Knight (brand)	6 kg	3
*	0.5 kg	2
Protein feeds	0.3 kg	2
Red Ram	5 kg	2
Self-made	It depends body weight	2
Mixed with Red Ram and self-made cereal feeds	2-3 kg	3

Note: * means no explanation.

2.11 Supplements used

In the United States, food additives include any substances intended or reasonably expected to become, either directly or indirectly, a component of food or to alter the characteristics of any food and include any substance intended for use in the manufacturing, processing, packaging, and storing of food (National Research Council, 2007**).** The more commonly accepted supplements range from broad spectrum vitamin/mineral supplements to those providing one or a selected few specific nutrients. Supplemental addition of vegetable oil as an alternative energy source is more commonly practiced, especially among endurance riders (Harris, 1997b). In the current survey results, minerals, vitamins, oils, yeasts, salts, electrolytes and bone powder were used for horses in 20 horse clubs in China (Table 16). When asked for reasons for using the supplements, various interpretation, reasoning or misleading responses were provided. This implies that the users might lack the basic knowledge of feeding horses with additives. There is evidence to suggest that many horse owners have a poor understanding

of equine nutrition (Hoffman et al., 2009) and decisions regarding nutritional management are often based on tradition, folklore, and misinformation (Roberts et al., 2013).

In this survey, 14/20 horse clubs responded that they used supplements for their horses. Only 7/20 horse clubs gave the reasons for using supplements, but several of those reasons were unclear. Various types of supplements being used included vitamins, minerals, oils, yeast, salt and electrolytes. The use of supplements in some horse clubs of China appears to be common.

In a survey of feeding practices, dietary supplement use, and knowledge about equine nutrition in New England, approximately 84% of owners reported including at least one dietary supplement in their horse's daily feeding. The most commonly used supplements were chondroprotectives, electrolytes, and multivitamins (Hoffman et al., 2009). In the United States, most horse owners, regardless of discipline or competitive status, reported giving supplements, indicated belief in their safety and efficacy and were using supplements to treat or prevent the issues they perceive their horses to have (Nicole et al., 2017). However, in the current survey, people did not appear to use supplements to "treat" or "prevent" issues, and responses were often lacking scientific backing. It is likely that they lacked knowledge of the reason for using the supplements for horses.

Table 16. Supplement use in 20 horse clubs in China

Kinds of supplements fed to horses	Reasons for using supplements
Complex	Nutritional elements
Calcium, salt	*Cheap and safe*
Vitamin, Ca, Mg	*
Multi-Vitamin	*
Additives	*
Oils	*
*	Nutrition
Bone powder	Improve fitness
Yeast	*
Oils and salt	*
Minerals	Mineral supplement
Ca, P, Mg	*
Multi-Vitamin	Trace elements
Electrolytes	Heavy uses horses

Note: * stands for no feedback.

3. Horse use

3.1 Most common reason for a horse to leave a horse club

Five horse clubs did not give feedback to this inquiry. The major reason for leaving was to be sold (Table 17). Although results showed that being sold was the main reason for a horse to leave, there was no clear indication of the reason for the sale and whether it was related with other issues mentioned in Table 17, such as disease, not needed, etc.

In the United States, the top three destinations of departed animals on surveyed operations were ranked as sold to private party, moved to another facility and sold at public auction. The top three reasons for permanent removal of horses from resident operations were business profit, situation change (e.g., owner, children moved, owner illness) and temperament problem (Kilby, 2007). By comparing the reasons between China and the United Sates, we

could conclude that sold could be the most important reason for a horse to leave a horse club or farm.

Table 17. The reasons for s horse to leave in 20 horse clubs in China

Reason	Number of clubs	Percentage
Sold	7	43.75
Horse owner moved	1	6.25
Disease	2	12.5
No medical response	1	6.25
Unable to compete or sale	1	6.25
Death	1	6.25
Retired	1	6.25
No need	1	6.25
Moved to branch	1	6.25

3.2 Month(s) horses used most often

Horses were used around the year around the country. However, equestrian leisure is obviously affected by weather and season. It is difficult to carry out on rainy or on snowy days and during cold seasons (Yan et al., 2011). The results from the current survey supported this point of view. The period of time of highest use was from July to September (Figure 10), and especially August, which is a vacation month for all education schools of China.

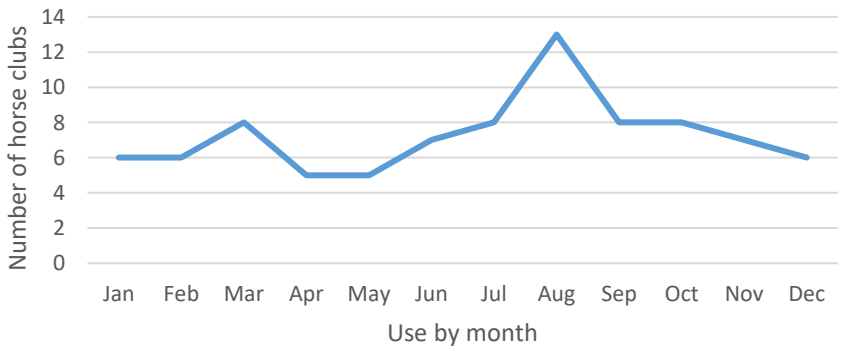

Figure 10. Monthly horse use in 20 horse clubs in China

3.3 Horse use in hr/d and d/wk

An investigation on horse use in 9 universities and colleges with equine programs in Kentucky showed that horses were used from 0.5 to 12 hr/wk with a mean of 4hr/wk per horse for all uses (Zhao et al., 2017). Compared to that, horses in this study were used for an average of 3 hr/wk per horse in 20 horse clubs of China. On average, horses were used 5 d/wk (Table 18).

Table 18. Time for horse use on a weekly and daily basis in 20 horse clubs in China

	Days for uses in a week (d)	Hours for uses in a day (h)
Average	5.18	3.13
Range	1-7	1-8
Number of clubs	17	16

3.4 Ways of tracking horse use in horse clubs

All 20 horse clubs responded this question. Twelve clubs (12/20) used daily logs, 9 used verbal communication with all faculty/staff, and 4 used a combination of both ways (Table 19). Four clubs listed other ways of logging horse use. However, records books and worksheets were categorized as daily logs, so those responses were combined. In previous studies, 3/9 programs used a combination of daily logs and verbal communication (Zhao et al., 2017).

Table 19. Ways of tracking horse use in 20 horse clubs in China

	Daily logs (written)	Verbal communication	Other Method (Explain)[1]
Number of clubs	12	9	4

[1] Other methods included record books, training plans, communication as events occur (but not between events), or worksheets for each horse

3.5 Ways of preventing over-use of horses/ponies in horse clubs

The issues of overuse of horses cannot be denied for horse clubs of China (Su et al., 2014; Zhang et al., 2008). In the current survey, the majority of horse clubs (76.7%) used daily logs/schedules and single person in charge to prevent overuse of horses. Three horse clubs used a combination of daily logs, verbal communication and single person in charge. Four clubs used a combination of the daily logs and single person in charge. Five horse clubs used only daily logs, one horse club used only verbal communication, and four horse clubs used only a single person in charge (Table 20). Three horse clubs claimed no such situation (overuse of horses) existed. Because no data in the current survey were from horse clubs located in Xinjiang Province and Henan Province, we are not sure whether the situations in the two places previously mentioned (Su et al., 2014; Zhang et al., 2008) were improved in recent years. However, the results of the current survey were encouraging, as it seems to suggest most horse clubs are using some sort of tracking system. This could show progress in improving horse welfare.

Table 20.Ways of preventing over-use of horses in 20 horse clubs in China

	Daily logs/schedules	Verbal communication	Single person in charge	No such situation
Number of clubs	12	4	11	3
Percentage	40	13.33	36.67	10.00

3.6 The percentage of non-employee riders falling into 5 categories of experience

Non-employee riders were divided into five categories relative to their riding or horse/pony handling experience (Table 21). When asked for what percentage of each category non-employee riders fell, 8 horse clubs did not respond the questions, probably because these

horse clubs were not open to the public, or their business was just for breeding horses, training and marketing (An et al., 2012).

On average, there were not many very experienced non-employee riders in 20 horse clubs (Table 21). China Equestrian Association was formed in 1982 and became a member of the International Federation for Equestrian Sports (FEI) in 1983. The Chinese Horse Industry Association was later formed in 2002 (Li et al., 2013). It is not likely for the Chinese horse industry to have many experienced non-professional riders in such a short period. This situation also was a concern for major health problems of horses in Chinese horse clubs (Su et al., 2014; Zhang et al., 2008).

Table 21. The percentage non-employee riders falling into 5 categories of experience in 20 horse clubs in China

Items	Little to no experience (Less than 1 year?)	Some experience (1-3 years)	Moderate experience (3-5 years)	A lot of experience (5-10 years)	Very experience (10+ years?)
Max	100	75	50	30	20
Min	0	1	0	0	0
Number of respondents	11	12	12	10	8

3.7 Percentages of horses/ponies in clubs considered appropriate for the riders

Three clubs did not respond to this inquiry. Although the maximum percentage of horses/ponies considered appropriate for beginner and intermediate riders could be 100% and 80%, respectively, the average numbers were 27.23% and 25.24%, respectively. This shows the different levels of training, experience, and teaching for different horse clubs. At the advanced level, the maximum value was only 30% (Table 22). The percentages of horses/ponies in clubs considered appropriate for the riders' experience were low. In China,

equestrian professionals such as coaches, trainers, veterinarians, farriers, high-level grooms, stable managers and other horse-related personnel resources are very scarce. There is a large gap for the development of International Equestrian sports, and talent shortage is an important factor restricting the development of equestrian practice in China (Sun et al., 2013). The scarcity of talented people may be one of the reasons for low percentage of horses/ponies in clubs considered appropriate for the riders.

Table 22. The percentage of horses/ponies considered appropriate for the riders in 20 horse clubs in China

	Beginners (0-3 years' experience)	Intermediate (3-8 years' experience)	Advanced (8+years'experience)
Max	100	80	30
Min	0	5	0
Average (%)	27.23	25.24	11.00
Num. of responses	17	16	16

3.8 Use of horse shoes in horse clubs

Four respondents did not answer this question. Fourteen respondents had horses without shoes, 12 respondents had horses with only front shoes and 12 respondents had horses with front and rear shoes (Table 23). In a survey on the management and training practice of UK dressage horses, 96% were shod in some way. Of those that were shod, 91% had shoes on both front and hind feet, 8% on the front feet only and 1% on the hind feet only (Walters et al, 2008). Compared to the results of survey mentioned above, some horse clubs in this survey showed much bigger shoeing percentage of front feet only (100%). That particular respondent had only 12 horses used for lessons and recreation.

Table 23. The percentages of mature horses/ponies wearing horse shoes in 20 horse clubs in China

	No shoes	Front shoes only	Front and rear shoes
Max	99%	100%	90%
Min	0	4%	0
Number of responses	14	12	12

Abnormal stresses can cause horse's hooves to wear unevenly or rapidly, requiring that those horses wear shoes. Horses' hooves can become quite worn out when subjected to the added weight and stress of a rider, pack load, cart, or wagon (Ensminger, 1990). Long gaps between shoeing, or turning out a horse with untrimmed feet can both result in detrimental outcomes. The old horseman's saying, "No foot, no horse." is an appropriate one. A good foot is one of the determining factors in the ability of the animal to stay sound and perform well (Bromiley, 2007). Sometimes a good hoof requires shoes for performance requirements and staying sound. In China, under the circumstances without enough qualified shoeing professionals, inadequate shoeing may be another cause of hoof problems observed widely around the country. In this survey, horses were shod differently, possibly because the horses were being used for different goals, including breeding, competing, barrel racing, jumping, dressage, endurance, teaching lessons, recreations, old or retired horses and museum horses (Figure 5).

Chapter 5. Conclusion

Assessing horse management and use in Chinese horse clubs has provided a limited but unique insight into the status of the Chinese equestrian industry. It would appear that the number of horse clubs in China is growing fast, and that East China and North China could be the top 2 regions with most horse clubs. International communication and cooperation brought more foreign horse breeds into China and helped improve the local horse industry, but the developmental space of domestic horse breeds was pressed. Based on these results, it is difficult to say whether horse use and management are satisfactorily meeting basic horse welfare needs. Results of this survey implied that most horse clubs in China lack equine knowledge and skills that could be used to improve their management. Clear knowledge of equine practice was not reflected in responses, suggesting that participants may not be implementing best practices. A future goal for research should include gaining responses from more horse clubs or farms. One prerequisite may be to persuade Chinese horse people to accept an on-line survey as a win-win activity for researchers and themselves, encouraging them to actively take part in a survey. Moreover, questions should be free from being “brain-hurting” – they should be clearly understandable so that they can be answered easily. In conclusion, the Chinese horse industry needs professionals in equine science and technology. The results of this study provided an introductive baseline of what is happening currently on which to base future research and recommendations for improvement, and to help mold curriculums for equine science and educational programs.

Appendix A. The chronology of China[23]

Table A. Timeline of Chinese History related to the survey

Dynasty	Period	Chronology Age
Xia	B.C. 2070– B.C.1600	
Shang	B.C. 1600–1046 B.C.	Ancient China
Zhou	B.C.1045-B.C.221	
Qin Dynasty	B.C.221–B.C.206)	Imperial China
Han	B.C. 206 – 220 A.D.	
Tang	618-907	
Song	960–1297	Medieval China
Yuan	1279–1368	
Ming	1368–1644	The Final Dynasties
Qing	1644–1912	
The people's republic of China	1949–Now	Modern China

[23] The history of China: dynasty/ era summary, timeline. https://www.chinahighlights.com/travelguide/culture/china-history.htm

Appendix B. Pilot Survey Instrument

一、 Demographic Questions

1. How many horses are there in your clubs for ages as following:

   a, 5 years (A number will be entered) ---

   b. 6- 10 years (A number will be entered) -----

   e. 11-15 years (A number will be entered)-------

   d. 16-20 years (A number will be centered)-------

   e. >20 years (A number will be entered)--------

   Total number of horses ----------

2. How old is the oldest horse in use in your club? -------

3. How many acres are used for turnout with grass? Without grass?

   With grass: (a number of acres will be entered) ------

   Without grass: (a number of acres will be entered) -------

4. How long are horses turned out? (Out of a stall) ?

   Enter a number of hours per day

5. Horse demographics in your club:

   Horse breeds and number of each

   Origin (country or local?) and number from each country

6. Goal of use for horses:

   Breeding (number entered)

   Competing (number) ?

      Barrel racing

      Jumping

      Dressage

Other (explain)

Lessons (number)

Recreation (number)

Other (explain)

7. What technique and skills you need most for the time being?

Veterinary

Farrier

Training (horse)

Coaching (people)

Stable managers

Nutritionist

Other: (and answer will be entered)

8. In the past year, relative to foreign coaches:

How many did you hire for up to 3 months?

How many did you hire for 3-6 months?

How many did you hire for 6-12 months?

How many were hired for more than a year?

9. If you hired foreign coaches, what was their nationality?

10. What were their duties?

Teach riding

Dressage

Polo

Western Pleasure

Teach hoof care

Teach nutrition

Teach dental care

Other (explain)

11. Generally speaking, how many events will you take horses to each year?

12. How many customers do you serve in a typical year?

How many adults?

How many children?

13. When was your club established?

14. Do you have a website? If so, what is URL?

二、 Horse management

15. How do you use employees as following?

Vet (part time or full time or both)

Farrier (part time or full time or both)

Dentist (part time or full time or both)

16. Major health problems?

Injury (cuts, kicks, strains, sprains, etc.)

Hoof issues (abscess, cracked hooves, abnormal growth/shape, etc.)

Colic

Horses too thin

Other: (explain)

17. What kind of forage (pasture, hay, etc.) do you feed your horses?

How much forage do you feed each horse each day?

How often do you feed forage to each horse each day (or is it always available)

18. What kind of concentrate (grain mix) do you feed your horses?

How much concentrate do you feed each horse each day?

How often do you feed concentrate to each horse each day?

19. What kinds of supplements do you feed your horses, and why?

三、 Horse use

20. What is the shortest time a horse stayed in your club?

Why did the horse leave? (Lameness, personality/behavioral issues or other----------)?

21. How many hours per day are horses used (actual student contact hours) each program?

a. Teaching (horse care, hoof care, etc.) (Enter number of hours per day)

b. Breeding

c. Riding

d. Other

22. How many days per week are horses used (actual student contact hours) each program?

a. Teaching (horse care, hoof care, etc.) (Enter number of hours per day)

b. Breeding

c. Riding

d. Other

OPTIONAL/ALTERNATE QUESTIONS

24. What months are your horses used most often? How many days a week/hours a day are they used on average? Focus on training/riding/competing?

25. How do you track horse use in your club? (Check all that apply)

a. Daily logs (written)

b. Verbal communication with all faculty/staff

c. Other (Explain)

26. How do you prevent over-use of horses/ponies in your club? (Check all that apply)

a. Daily logs/schedules

b. Verbal communication with all faculty/staff

c. Single person in charge of horse assignments

d. Other (Explain)

27. On average, what percentages of riders fall into the following categories, relative to their riding or horse/pony handling experience?

a. Little to no experience (less than 1 year?)_____%

b. Some experience (1-3 years)

c. Moderate experience (3-5 years)

d. A lot of experience (5-10 years)

e. Very experience (10+ years?)

28. Based on equine personalities or training, what percentages of horses/ponies in your club are considered appropriate for the riders listed below?

a. Beginners (0-3 years' experience) (enter percentage)

b. Intermediate (3-8 years' experience)

c. Advanced (8+years'experience)

29. What percentage of mature horses/ponies in your program wear horse shoes?

a. No shoes

b. Front shoes only

c. Front and rear shoes

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