

Review

Inheritance and Innovation: The Historical Evolution and Contemporary Transformation of Traditional Chinese Veterinary Medicine

Xinhui Wang, Fenglin Miao, Qiuyu Xie, Liyun Cao, Xiyuan Zhao, Wuren Ma*

ABSTRACT

Traditional Chinese veterinary medicine (TCVM) has a long developmental history, with its origins traceable to antiquity. It took initial form during the early hierarchal society (1046 BCE) and gradually matured into a systematic discipline through the feudal period, establishing a comprehensive theoretical framework based on *Yin-Yang* and Five Elements theory, the theory of *Zang-fu* organs, and treatment guided by syndrome differentiation. Its progression stagnated in the late Qing Dynasty to wartime periods, experiencing revival only after the establishment of the People's Republic of China, when policy prioritized cultural and educational advancement. In the contemporary era, TCVM has undergone significant transformation through integration with modern veterinary medicine. Its clinical focus, once centered almost exclusively on traditional livestock, has expanded to incorporate the companion animal sector, where it demonstrates efficacy in managing chronic, age-related conditions, as well as disorders affecting exotic pets. Within livestock production, TCVM has evolved from individualized to population-level syndrome differentiation, with its preventive treatment philosophy supporting sustainable farming practices and antibiotic reduction policies. The discipline actively incorporates modern scientific methodologies, including molecular biology, network pharmacology, artificial intelligence, and advanced diagnostics to enhance its theoretical foundation and clinical applicability. Despite persistent challenges, TCVM continues to expand its global presence through international education and professional training. Future development should adhere to the principle of “conserving the essence while fostering innovation,” promoting integrative veterinary medicine, strengthening industry-academia-research collaboration, and cultivating a multi-tiered professional workforce. In doing so, these efforts will further enable TCVM to contribute to animal health, sustainable agriculture, and the global “One Health” initiative.

Keywords: historical development, modernization, traditional Chinese veterinary medicine

ABBREVIATIONS: BCE: Before Common Era/ BC (Before Christ); CE: Common Era/ AD (Anno Domini); EAP: electro-acupuncture; TCM: traditional Chinese medicine; TCVM: traditional Chinese veterinary medicine; TLR: Toll-like receptor

Traditional Chinese veterinary medicine (TCVM) is a significant branch of traditional Chinese medicine (TCM) and an integral component of China's rich cultural heritage. Its diagnostic principles and theoretical framework have historically supported clinical veterinary practice and continue to be adapted and developed within modern veterinary contexts. Currently, TCVM is evolving and gaining international recognition. Nevertheless, while recent research has increasingly focused on modern applications and scientific investigation, such as pharmacological validation, new drug development, and efficacy assessment; systematic integration and critical examination of TCVM's historical development and academic evolution remain limited. This paper, therefore, systematically reviews historical records and related literature to illustrate that the development of TCVM has not followed a linear trajectory, but rather reflects an

adaptive progression from “empirical accumulation” to “systematic integration” and eventually toward “integrative transformation” with modernization.

HISTORICAL TRACING OF TCVM

Primitive Society: The Origin of TCVM

Traditional Chinese veterinary medicine has a long history, with the earliest records of treating livestock

Author Professional Degrees and Certifications: MS (Wang, Miao, Xie, Cao); DVM (Zhao); PhD (Ma); **From:** College of Veterinary Medicine, Northwest A&F University, Yangling, Shaanxi, China (Wang, Xie, Cao, Zhao, Ma); Yangling Longruitang Traditional Chinese Veterinary Medicine Engineering Center Co. Ltd, Shaanxi, China (Miao); ***Address correspondence to** Dr. Wuren Ma (vetma@nwfau.edu.cn).

dating back to ancient times. Its origins can be traced to the period when humans began domesticating wild animals, approximately 7,000 years ago during the primitive society.¹ Archaeological excavations at the *Peiligang* cultural site in Henan Province reveal accumulations of cattle and pig bones, each numbering over a thousand. Similarly, the unearthed pig bones, pig figurines, as well as accumulations of water buffalo and deer skulls from the *Hemudu* and *Luojiajiao* cultural sites in Zhejiang Province provide evidence of livestock domestication in both northern and southern China.² The health and reproduction issues of domestic animals contributed to the emergence of primitive veterinary medicine. Consequently, through long-term efforts to control livestock diseases, early veterinary knowledge and methods came into being. Archaeological findings indicate that as early as the Neolithic period (c. 10,000–2,000 BCE), there were traces of using stone needles to incise abscesses and for acupuncture, which are considered the earliest medical tools in ancient China and the predecessors of the “needles” used in modern acupuncture therapy.^{3,4}

During the Shang Dynasty (16th–11th century BCE), the earliest known form of Chinese writing, oracle bone inscriptions emerged. Their discovery has provided concrete evidence for understanding the origins of TCVM. According to these inscriptions, facilities for confining livestock such as pigsties, sheepfolds, and horse stables had already been implemented. For example, archaeological sites at *Banpo* and *Jiangzhai* in Shaanxi have revealed enclosures constructed with thin wooden stakes, inside which thick accumulations of animal manure were found.⁵ These findings reflect an existing awareness of animal housing and protection during that period. Among the unearthed bronze artifacts from the era, knives and needles used for castration have been identified. Furthermore, oracle bone inscriptions include pictographic characters for boars (*Shi*) in which the genitalia appear severed; a feature anthropologists interpret as representing castrated male pigs.⁶ These findings indicate that basic veterinary practices had already begun to take shape during this period.

Early Hierarchical Society and TCVM Origins

The Western Zhou Dynasty (1046–771 BCE)

Building upon the foundation laid in earlier periods, TCVM saw further development during the highly stratified society of the Western Zhou era. This period witnessed the emergence of textual records pertaining to traditional medicine. *Shi Jing* (The Book of Songs), China’s earliest anthology of poetry, documents over two hundred species of plants and animals, with more than a hundred later used for medicinal purposes. It also describes conditions such as “*Xuan Huang*”, a disease-causing yellow discoloration in horses at an advanced stage, and “*Tu*,” referring to exhaustion preventing a horse from moving forward.⁷ Furthermore, *Shan Hai Jing Xi Shan Jing* (The Classic of Mountains and Seas: Western Mountains)

records: “There is a grass, shaped like a sunflower, smelling like wormwood, called *Du Heng* and it can make a horse ‘*Zou Ma*’.” The commentator Guo Pu explains “*Zou Ma*” as “a horse, having taken it, becomes robust and runs swiftly”, suggesting that feeding *Du Heng* grass to horses was believed to enhance their vigor and speed.⁸ These records demonstrate both the diversity of animal species at the time and the existence of certain therapeutic methods for animal diseases.

This environment fostered the emergence of the “veterinarian” as a distinct profession, which first appeared during the Western Zhou Dynasty. *Zhou Li Tian Gong* (The Rites of Zhou: Offices of Heaven) states: “The veterinarian is in charge of treating animal diseases and animal ulcers. In treating animal diseases, administer medicine orally and then exercise the animal to regulate the treatment, to stimulate its *Qi*, observe its reaction, and nurture it accordingly. In treating animal ulcers, administer medicine orally to expel the pathogenic factors, and then apply medicinal treatments, provide care, and regulate its diet”.⁹ Here, “animal diseases” refer to internal medicine, while “animal ulcers” refer to external or surgical conditions. These records indicate that veterinary practice at the time had already differentiated between internal and external medicine, employing methods such as oral administration of medicine, surgical procedures, and dietary therapy based on the animal’s condition. This represents a leap forward in the history of TCVM.

The Spring and Autumn Period (770–476 BCE)

Historical records from the Spring and Autumn period provide evidence of contemporary understanding of animal diseases. The chronicle *Zuo Zhuan* (Zuo’s Commentary on The Spring and Autumn Annals) contains references to serious conditions such as “*Zhi Gou*,” a term for rabies, and “*Cu Luo*,” a term for animal mange.¹⁰ An important development during this period was the deepening knowledge of horse medicine. During this period, the art of judging livestock, particularly horses, developed considerably. A legendary figure named Sun Yang, renowned as Bo Le, was celebrated not only for his exceptional skill in evaluating and treating horses but also for his profound understanding of equine anatomy, physiology, and pathology. He was knowledgeable about horse acupuncture points and applied this technique to treat various ailments. His influence was such that numerous later acupuncture texts were attributed to him, securing his place as a pioneering figure in the history of TCVM acupuncture.¹¹

The period also saw a growing awareness of the importance of controlled animal breeding. People began paying attention to optimal mating seasons and took special care to protect pregnant mares. *Lü Shi Chun Qiu* (Master Lü’s Spring and Autumn Annals) records that during midsummer, “pregnant mares were separated from the herd”.¹² This practice indicates that pregnancy could be reliably determined by this time of year, and separating the pregnant mares was a deliberate measure to prevent them from harm.

Feudal Society: Gradual Systematization of TCVM

During the feudal period, rapid advancements in productive forces provided a powerful impetus for the continuous accumulation of practical experience. A deepened societal awareness of the importance of animal husbandry spurred unprecedented breakthroughs in both the livestock industry and the veterinary profession. This era witnessed the compilation of numerous foundational texts on TCVM, the gradual crystallization of TCVM's theoretical framework, and the widespread application of distinctive techniques such as livestock judging (*Xiang Chu*), acupuncture, transrectal examination, and even artificial incubation.¹³

The Warring States Period (475–221 BCE)

During the Warring States period, military needs drove a major shift in warfare as mounted combat largely replaced chariot warfare, establishing cavalry as a major military branch. This significantly increased the use of horses, leading to frequent outbreaks of horse diseases. These developments greatly stimulated the growth of the veterinary profession, leading to the emergence of veterinarians specializing in the treatment of horse ailments. Historical texts from this era contain records of various horse diseases. For instance, the *Zhan Guo Ce* (Strategies of the Warring States) documents conditions such as “horse elbow ulceration” and “horse knee fracture.” Furthermore, the *Yan Zi Chun Qiu* (Annals of Master Yan) records a case of horse heatstroke: “Galloping for prolonged periods in extreme summer heat leads, in severe cases, to the death of the horse, and in milder cases, to its injury,” indicating an exploration into the causes of horse mortality and injury.¹⁴

A particularly insightful passage from *Zhuang Zi Ma Ti* (Zhuangzi: Horses' Hooves) states: “Horses' hooves can tread frost and snow and their hair can ward off wind and cold. They eat grass and drink water, and when pleased, they leap and gallop. This is the true nature of horses. Even if you had grand terraces and magnificent stables, they would be of no use to them. Then along comes Bo Le, saying, ‘I am adept at managing horses. Yet, when subjected to branding, grooming, hoof trimming, and branding with decorative marks, then tethered with halters and hobbles, and confined in stables, 20 to 30 percent of the horses perish. When further deprived of food and water, driven to gallop or sprint, forced into rigid formations, and disciplined with uniformity, all while facing the threat of bridle ornaments ahead and the lash of the whip behind, more than half of the horses die.’”¹⁵ This passage analyzes the causes of horse injury and mortality, identifying factors such as poor husbandry, improper management, and excessive workload as important contributing factors, revealing that veterinary understanding of disease etiology and pathogenesis had advanced significantly during this period.

The Qin and Han Dynasties (221 BCE–220 CE)

“The state will be impoverished and its resources insufficient if the six domestic animals (pigs, cattle, sheep,

horses, chickens, and dogs) are not thriving.” Reflecting this principle, from the pre-Qin era through the Qin and Han Dynasties, the state placed great emphasis on the development of animal husbandry. A series of measures, such as promoting the use of cattle-drawn plowing, establishing the *Tai Pu* Temple, or Court of the Imperial Stud, to oversee horse administration, formulating Chinese earliest known veterinary regulations in the *Jiu Yuan Lü* (Stud Farm Regulations), Statutes on Stables and Pastures, and introducing superior horse breeds from abroad; gradually elevated the role of animal husbandry in socioeconomic development.^{11,16} In tandem, the veterinary profession also achieved steady progress. Building upon the earlier foundation of horse veterinarians, the industry expanded to include servants assisting in horse care and introduced dedicated cattle doctors. This development signifies that veterinary specialization during the pre-Qin period had begun well-defined, with technical activities extending to a wider range and covering a broad scope.¹⁷

During this period, the emergence of numerous foundational texts in traditional medicine also provided important theoretical references for traditional veterinary practice. *Huang Di Nei Jing* (The Yellow Emperor's Inner Canon), a cornerstone work of TCM, introduced for the first time core concepts such as *Yin-Yang* and Five Elements, the holistic view, and the theory of *Zang-fu* organs and Meridians. Comprising two major parts, *Su Wen* (Basic Questions) and *Ling Shu* (Divine Pivot), the text covers physiology, pathology, diagnosis, treatment, and health cultivation. Many of its doctrines provided essential references for veterinarians in diagnosing animal diseases, understanding their etiology and pathogenesis, and determining therapeutic approaches. *Shen Nong Ben Cao Jing* (Shen-nong's Herbal Classics), one of the earliest extant pharmacopoeias in China, specifically mentions treatments for animal ailments, such as using “*Niu Bian* (*Aconitum lycoctonum*) to kill cattle lice and treat cattle diseases,” “applying catalpa leaves to pig sores,” and “using realgar to treat mange.”¹⁸

Additionally, a specialized medical treatise, *The Liao Ma Shu* (Book of Horse Therapeutics), composed during the Western Han Dynasty (202 BCE–8 CE), has been archaeologically excavated. The text systematically records the etiology, diagnostic principles, formulations, and herbal therapeutics for horse diseases.¹⁹ Research suggests the original work was likely compiled during the Warring States period and recopied in the Qin Dynasty. It is considered the first Chinese dedicated monograph on the diagnosis and treatment of various horse diseases. This text places notable emphasis on disease etiology, recording, for instance, that a horse becoming emaciated and fatigued during travel, combined with rough or stony ground, was a significant cause of injury leading to Kidney (*Zang-fu*)-related pain disorders.²⁰

Furthermore, bamboo slips excavated from border regions of the Western Han Dynasty, namely the *Ju Yan Han Jian* (Slips) and the *Liu Sha Zhui Jian* (Slips), contain what are currently recognized as the earliest Chinese veterinary formulas with explicit textual documentation.

One formula, “Formula for Treating Horse Injury by Cold Water,” lists ingredients such as *Jiang* (Ginger), *Gui* (Cinnamon), *Xi Xin* (Asarum), *Zao Jia* (Gleditsia), *Fu Zi* (Aconite), *Yuan Zhi* (Polygala), and *Jie Geng* (Platycodon), used to treat symptoms like intestinal rumbling, abdominal pain, and watery diarrhea in horses caused by External Cold. Another states, “Prepare the medicine by blending it into an ointment, boil until bubbling, and apply it to the cow’s neck for efficacy,” describing a heated medicinal poultice applied externally to treat cattle ailments.²¹

The *Hua Tuo Shen Fang* (Divine Formulas of Hua Tuo) mentions that “cattle plague is highly contagious. If one cow has the disease, it will transmit to others,” documenting both the concept and characteristics of epidemic disease in cattle. It also records various treatments for cattle diseases, including single-herb formulas, topical applications, and medicinal baths.²² These records not only reveal the widespread occurrence of cattle epidemics at the time but also indicate a fundamental understanding of contagious diseases in livestock.

In the late Eastern Han Dynasty, Zhang Zhongjing, a prominent physician of the period, compiled the *Shang Han Za Bing Lun* (Treatise on Cold Damage and Miscellaneous Diseases). He established the “Six-Meridian pattern differentiation” system and the framework of “principle, method, formulas, and herbal medicine,” thereby establishing the guiding principle of treatment based on pattern differentiation. This system remains an important theoretical criterion for diagnosis and treatment in TCVM to this day.

Wei, Jin, Northern and Southern Dynasties (220–589 CE)

During this period, TCVM experienced substantial development, building upon the foundations laid by the Han Dynasty. Specialized volumes on animal husbandry and veterinary medicine began to appear within many comprehensive agricultural treatises. The *Zhou Hou Bei Ji Fang* (Handbook of Formulas for Emergencies), compiled by the renowned Jin Dynasty physician Ge Hong, included formulas for treating acute epidemics and digestive disorders in livestock such as cattle and horses. For instance, it recorded the “Formula for Treating Horse Epigastric Distension,” a life-threatening condition involving severe bloating or gastric dilation. The treatment method described was: “Take forty or fifty shoe soles, cut them open with a knife, make a hole in the center, heat them until red-hot, place them on the belly, and apply as a hot compress. Replace when cooled.” This represents a typical example of using hot compress therapy to treat horse emergencies, indicating significant advancements in veterinary techniques at the time.

The *Qi Min Yao Shu* (Essential Techniques for the Welfare of the People), compiled by Jia Sixie during the Northern Wei Dynasty, contains extensive TCVM-related records in its dedicated animal husbandry and veterinary volume. This reflects a preventive approach consistent with the concept of “treating disease before it arises.” The text provides detailed information on horses, covering aspects such as breeding selection, feeding, training,

and the diagnosis and treatment of common ailments. It meticulously outlines the feeding requirements for expeditionary horses, noting that as these were long-distance travel horses, to keep them robust, their fodder should be finely chopped, with the leaves winnowed away to retain only the stalks, and mixed with grain and bean feed.²³ Regarding disease prevention and treatment for horse mange, it recommends applying a mixture of lard and sulfur to the affected area; a straightforward method that remains of reference value today.

Acupuncture and moxibustion theory also became more systematized during the Wei, Jin, and Northern and Southern Dynasties period. Huangfu Mi integrated classical texts such as the *Ming Tang Kong Xue Zhen Jiu Zhi Yao* (Basic Questions, Divine Pivot, and Systematic Classic of Acupuncture and Moxibustion) to compile the *Zhen Jiu Jia Yi Jing* (Systematic Classic of Acupuncture and Moxibustion). This work systematically organized the theory of Meridians and acupuncture points, detailing the location, therapeutic effects, and needling techniques for 349 points.²⁴ It provided crucial theoretical guidance for the development of acupuncture within TCVM.

The Sui and Tang Dynasties (581–907 CE)

The Sui and Tang Dynasties witnessed further and more defined achievements in the development of veterinary medicine. This period saw the compilation of numerous specialized texts on the diagnosis and treatment of livestock diseases, a continued refinement of veterinary specializations, and even the emergence of formal veterinary educational institutions. Amid extensive foreign interactions and frequent international exchanges during this era, a wealth of veterinary knowledge and texts spread overseas, exerting a profound influence on the development of veterinary medicine in neighboring countries and regions.²⁵

The Sui Dynasty witnessed the emergence of a body of specialized literature dedicated to horse medicine, such as *Bo Le Zhi Ma Za Bing Jing* (Bo Le’s Classic on Treating Various Horse Diseases) (in one volume), *Yu Ji Zhuan Zhi Ma Jing* (Yu Ji’s Treatise on Treating Horses) (in three volumes), and *Zhi Ma Niu Tuo Luo Deng Jing* (The Classic on Treating Horses, Cattle, Camels, and Mules) (in three volumes with an index).²⁶ During the Tang Dynasty, Emperor Gaozong commissioned the *Xin Xiu Ben Cao* (Newly Revised Materia Medica), which represents Chinese earliest pharmacopoeia intended for both human and veterinary use.

Under Emperor Wenzong of Tang, Li Shi compiled the *Si Mu An Ji Ji* (Collection on the Peaceful Steed), regarded as the Chinese first veterinary textbook. The work systematically covers topics including horse judging, feeding, physiology, pathology, diagnosis, treatment, acupuncture, and formulas, summarizing the theoretical and clinical practices of earlier horse medicine. Its compilation marked the formal inception of veterinary education in China.²⁶

According to the *Jiu Tang Shu* (Old Book of Tang), during the Shenlong era (705–707 CE), the *Tai Pu* Temple employed “600 veterinarians, 4 veterinary scholars, and

100 students”.²⁷ Students who passed examinations could remain at the academy as doctoral candidates or be appointed as official veterinarians under the Bureau of the Imperial Stables (*Shang Cheng Ju*). The *Si Mu An Ji Ji* also includes the *Bo Le Zhen Jing* (Bo Le Acupuncture Classic) in its first volume, which lists 77 acupuncture points, specifying their locations, needling techniques, depth and angle of insertion, functions, and the diseases they treat. This text is the earliest extant specialized work on veterinary acupuncture in China.²⁸

Veterinary medicine also developed significantly among Chinese ethnic minorities during this period. Archaeological findings in Tibet include specialized texts such as *Lun Ma Bao Zhu* (On the Horse’s Bezoar) and *Yi Ma Lun* (Treatise on Horse Medicine). Meanwhile, a Tang Dynasty tomb in Xinjiang yielded *Niu Yi Fang* (Formulas for Cattle Diseases).²⁹ Additionally, Wang Tao’s *Wai Tai Mi Yao* (Medical Secrets of an Official) compiled 31 formulas for treating diseases in donkeys, horses, cattle, and dogs, summarizing the experiences of earlier practitioners.³⁰ Han E’s *Si Shi Zuan Yao* (Essentials of the Four Seasons), a Tang Dynasty agricultural treatise, records techniques for controlling cattle epidemics, treating horse throat swelling, and managing domestic pigs, including tail-docking and fattening methods. Although the original text was lost in China, it survived through reprints in Korea and Japan, allowing its content to be recovered by later generations.³¹ These developments illustrate that TCVM not only reached a high level of sophistication domestically during the Sui and Tang Dynasties but also exerted a transregional influence, with its knowledge and texts being exchanged and adapted by neighboring countries.

The Song and Yuan Dynasties (960–1368 CE)

During the Song Dynasty, although the state’s management of horse administration was not especially strong, several innovative policies emerged that would later prove influential. According to the *Song Hui Yao Ji Gao* (Draft Compendium of Documents from the Song Dynasty), in the second month of the second year of Jingde era (1005 CE) under Zhenzong Emperor, an imperial decree ordered that “sick horses from the Zhengzhou horse-breeding office be moved to a dedicated facility in the capital for care and feeding.” Later, in the eleventh month of the fourth year of the Dazhong Xiangfu era (1011 CE), it was recorded that “both an Upper and a Lower Pasturage and Care Station were established to treat and nurture sick horses from various stables in the capital. Those with mild illnesses were sent to the Upper Station, while those with serious conditions were sent to the Lower Station, and treatment was provided across ten feeding troughs”.³² These records indicate the establishment of dedicated facilities for the care of sick horses, which can be regarded as precursors to modern veterinary hospitals.

In the early Northern Song period, a *Mi Yao Ku* (Medicinal Honey Depot) was established in Xuanyi Ward, managed by three supervising officials appointed from the ranks of capital officials and military officers. This

depot was responsible for storing sugar, honey, and medical supplies specifically for the treatment and feeding of the imperial army’s horses, functioning as an early equivalent of a veterinary pharmacy.³³ Additionally, the Northern Song Dynasty text Shiliang Ludocuments the practice among northern nomads of using strong wine to inebriate horses prior to performing intercostal thoracotomy and removing necrotic lung tissue. This is regarded as the earliest documented case of thoracic surgery in Chinese veterinary history.³⁴ The *Song Chao Hui Yao* (Documents of the Song Dynasty) also records that in the second year of the Kaibao era (969 CE), a *Pi Bo Suo* (Skinning and Flaying Office) was established under the *Tai Pu* Temple to dispose of horses that could not be cured.⁵ This office reflects the ancients’ rational utilization and management of animal resources.

In addition, the poultry incubation technology in the Song Dynasty also achieved important progress. Books such as *Er Ya Yi* (Book of Plants and Animals) recorded: “When ducks lay too many eggs to incubate them all, they can be hatched using the warmth of fermented cow dung.”³⁵ This indicates that, building upon the surrogate incubation technique of the Han Dynasty, the people of the Song Dynasty invented the method of using fermented cow dung to generate heat for incubation. This approach significantly enhanced poultry incubation capacity, established a technical foundation of artificial incubation, and provided the basis for the later development of diverse incubation techniques such as *Kang-fu* (heated brick bed incubation) and *Gang-fu* (vat incubation).

The invention of movable-type printing during the Song Dynasty enabled a wider dissemination of veterinary knowledge and clinical experience through the compilation and preservation of texts. Wang Yu’s *Fan Mu Zuan Yan Fang* (Compilation of Proven Formulas for Livestock) and *An Ji Yao Fang* (Formulas for the Peaceful Steed) are considered the earliest specialized works on veterinary pharmacology in China. These texts include methods for seasonal conditioning, year-round feeding practices, and fifty-seven formulas for treating disorders of the five *Zang* organs, accompanied by acupuncture techniques. They also contain formulas for miscellaneous ailments and thirty-four rhymed formulas with illustrations for treating camel diseases. These works were later incorporated into volumes seven and eight of the *Si Mu An Ji Ji* during the Jin and Yuan Dynasties. Additionally, the “Bibliographic Treatise” of the *Song Shi* (History of the Song Dynasty) lists numerous other veterinary texts in its medical literature section, including *Ma Jing* (Horse Classic), *Ming Tang Jiu Ma Jing* (Illustrated Canon of Moxibustion for Horses), *Xiang Ma Bing Jing* (Classic on Judging and Treating Sick Horses), *Chong Ji Yi Ma Fang* (Recompiled Formulas for Treating Horses), *Liao Tuo Jing* (Classic on Treating Camels), and *Shi Kuang Qin Jing* (Master Kuang’s Classic on Birds and Beasts).

During the Yuan Dynasty, the Mongol conquest led to the establishment of rule over China proper, intensifying ethnic tensions and frequent warfare. Despite the political instability, the Yuan empire’s vast territory, stretching

from China proper to Central Asia, necessitated a developed network of courier stations connecting the realm to East Asia and Europe.³⁶ This infrastructure required a large number of military and postal horses to maintain state operations, leading to a significant expansion of state-run animal husbandry and veterinary services.

The most significant achievement in veterinary medicine during this period was the compilation of the *Quan Ji Tong Xuan Lun* (Complete Treatise on the Recovery of the Steed) by Bian Bao, who had served in the administrative position of “*Guan Gou*”. The work systematically summarizes the etiology, pathology, symptoms, and treatments of common horse ailments. Its most prominent contribution lies in the detailed discussion of horse colic, covering gastrointestinal anatomy, physiology, and pathology, as well as the causes, symptoms, and treatments of various forms of colic. The text offers particularly insightful descriptions of diagnostic and therapeutic techniques via the rectum, which constitute the essence and hallmark of the treatise.³⁷ The final six chapters of its “Thirty-nine Discourses” also address horse ophthalmology, lameness diagnosis, and pain management, including the early use of acupuncture at the *Kai-tian* acupoint to treat horse eyeworm disease; representing the first documented application of acupuncture in veterinary ophthalmology.³⁸

During the Song-Jin period, the renowned physician Li Gao proposed a similar thesis: “Impairment of the Spleen and Stomach serve as the root of all ailments.” In contrast to Li Gao’s focus on Spleen Deficiency in human medicine, Bian Bao posited that disharmony of Stomach *Qi* constituted the core pathogenesis, characterizing it as an Excess pattern.³⁹ This distinction reflects a sophisticated level of engagement with disease etiology at the time.

The Mongol conquests also connected China with the Islamic world, facilitating the exchange of knowledge along the land and maritime Silk Roads. Medical traditions from Arabia and Persia, including the prominent *Hui Hui* medicine, were introduced to China. The *Hui Hui Yao Fang* (Formulary of Hui Hui Medicine) contains more than 400 herbal medical substances, 266 of which are transliterated foreign names, indicating their external origin. Commonly used items such as *Xue Jie* (Dragon’s blood), *Wu Hua Guo* (Figs), *Mo Yao* (Myrrh), *Hu Jiao* (Pepper), *Su He Xiang* (Storax), *Ru Xiang* (Frankincense), and *Ding Xiang* (Cloves) were widely employed in the treatment of military horses.⁴⁰ The scholar Tao Zongyi recorded in his *Nan Cun Chuo Geng Lu* (Notes Made After Retiring from Farming in the Southern Village) an account about a *Hui Hui* physician treating a horse that had collapsed from abdominal distension: “I once saw a traveler’s horse at the *Changmen* Gate in Pingjiang, its belly swollen and lying on the ground. An old *Hui Hui* man in the shop cut a small piece from the inside of its left leg and removed something unknown. The horse then stood up and was ridden away. Truly, the Western Regions abound in marvelous techniques!”⁴¹ These accounts reflect the active integration of Chinese and foreign veterinary knowledge within the pluralistic framework of the Yuan Dynasty.

The Ming Dynasty (1368–1644 CE)

From the late Yuan to the early Ming Dynasty, the horse-breeding industry expanded significantly before gradually declining after the Wanli era (1573–1620 CE). Veterinary medicine during the Ming Dynasty was characterized primarily by the inheritance and gradual refinement of earlier knowledge. The *Zuan Tu Lei Fang Ma Jing* (Illustrated and Classified Formulas for Horses), also known as *Lei Fang Ma Jing* (Classified Formulas for Horses), compiled during the Chenghua era, focused mainly on the prevention and treatment of horse diseases. A notable section preserved in the extant text, the “Seventy-Two Major Illnesses of the Heavenly King and Their Manifestations,” is directly derived from the *Si Mu An Ji Ji*. In the twenty-second year of the Wanli era (1594), Yang Shiqiao, the Minister of the *Tai Pu* Temple, oversaw the publication of the *Ma Shu* (Horse Book) and the *Niu Shu* (Cattle Book). These works, in essence, also represent a continuation and synthesis of the two foundational veterinary texts: the *Si Mu An Ji Ji* and the *Quan Ji Tong Xuan Lun*.

The most prominent and comprehensive work of the Ming Dynasty, the *Yuan Heng Liao Ma Ji* (Yuanheng Treatise on the Treatment of Horses), also represents a synthesis and elevation of pre-existing veterinary knowledge. In the thirty-sixth year of the Wanli era (1608), as the state’s horse administration was in decline and animal husbandry languished, two brothers and “folk” veterinarians (i.e. master-apprentice education/clinical training), Yu Benyuan and Yu Benheng, witnessed the widespread loss of horses to disease and the ruin of peasant households due to official neglect. Drawing upon their extensive clinical experience, they compiled the *Yuan Heng Liao Ma Ji*. Ding Bin, a high-ranking official at the time, had previously noted that “half of the government’s and the people’s livestock perished due to the incompetence of unqualified veterinarians.” Recognizing the critical role of veterinary medicine in the state and society, he admired the Yu brothers’ exceptional skill and offered to write a preface for their work. His aim was to ensure the transmission of traditional veterinary knowledge to future generations and to persuade the ruling class to recognize the importance of animal husbandry and improve its management.⁴²

The *Yuan Heng Liao Ma Ji* is exceptionally comprehensive in scope. Its contents cover the physical characteristics of cattle and horses, essential husbandry practices, and the diagnosis and treatment of over a hundred horse and cattle diseases, with detailed explanations of etiology, pathology, symptoms, treatments, and nursing methods for each condition. The “Autumn Volume” of the treatise presents the “*Ba Zheng Lun* (Eight Syndromes Theory),” a diagnostic framework analogous to, yet distinct from, the “Eight Principles” used in human medicine. These Eight Syndromes (Cold, Heat, Deficiency, Excess, Exterior, Interior, Pathogenic Factor, Healthy *Qi*) are each discussed individually, supplemented by mnemonic verses and illustrations.⁴³

The treatise also details diagnostic methods such as *Se Zhen* (observation of complexion) and *Mai Zhen* (pulse

diagnosis), recorded in the “*Mai Se Lun* (Discourse on Pulse and Complexion).”⁴⁴ Diagnostic approaches in the Ming Dynasty TCVM encompassed the four examinations (*Si Zhēn*): inspection, auscultation/olfaction, inquiry, and palpation. Observation of complexion, a component of inspection, involved assessing an animal’s condition by examining the color, temperature, and moisture of the oral cavity. The primary focus was the tongue, including the lips, tongue, dental ridges, and the silkworm spots, or wocan, a pair of fleshy protuberances beneath the tongue, with the left termed “*Jin Guan*” and the right “*Yu Hu*”. A normal horse oral complexion was described as lotus-red, bright, lustrous, and moist; the appearance of green, red, yellow, white, or black hues without luster indicated pathology. These five colors were also correlated with the five *Zang* organs, with different oral complexions reflecting disorders in specific visceral systems.⁴⁵

Pulse diagnosis, or palpation, developed relatively late in TCVM due to the deep location of arteries in livestock and the difficulty of restraint and cooperation. While the *Quan Ji Tong Xuan Lun* suggested taking the pulse at the belt vessel behind the horse’s elbow, a venous site unsuitable for pulse diagnosis; the *Yuan Heng Liao Ma Ji* revised this, designating the “double wild ducks” (*Shuang Fu*), muscular grooves on either side of the trachea above the sternum, as the proper site for pulse examination.⁴⁶ The “Discourse on Pulse and Complexion” categorizes pulse patterns into normal (*Ping Mai*), pathological (*Fan Mai*), and critical (*Yi Mai*) types. Normal pulses vary seasonally: wiry in spring, full in summer, floating in autumn, and deep in winter. Pathological pulses indicate disease, while critical pulses, including the “leaking roof” (*Wu Lou*), “pecking sparrow” (*Que Zhuo*), “drifting shrimp” (*Xia You*), and “untied rope” (*Jie Suo*) patterns; signify a life-threatening condition.⁴⁷ With its comprehensive content and high practical value, the *Yuan Heng Liao Ma Ji* represents a seminal work, marking the maturation and refinement of TCVM in the late imperial period.

Acupuncture and moxibustion witnessed further development during the Ming Dynasty. The *Bo Le Ming Tang Lun* (Bole’s Discourse on the Hall of Illumination), included in the “Spring Volume” of the *Yuan Heng Liao Ma Ji*, provides specialized discussions on horse acupuncture. It features illustrations and descriptions of techniques such as fire needling and *Qi* needling, bloodletting from the Six Meridians, cauterization and branding, and specialized surgical procedures, supplemented by mnemonic verses on the Six Meridians.⁴³

TCVM evolved in tandem with human medicine, drawing extensively from classical medical texts. The *Ben Cao Gang Mu* (Compendium of Materia Medica), a comprehensive pharmacological work completed in the sixth year of the Wanli era (1578 CE) by the renowned physician Li Shizhen, includes not only formulas for human ailments but also 229 formulas for veterinary use.¹⁸ The text provides explanations of the properties, flavors, Channel affiliations, therapeutic effects, and methods of application for these medicines. Covering treatments for horses, cattle, sheep, pigs, and dogs, it offers significant

resources for TCVM, reflecting the clinical experience and knowledge of veterinary pharmacotherapy during this period.

The Qing Dynasty (1644–1912 CE)

The formation and refinement of TCVM as a discipline did not occur in isolation. It was a derivative of productive forces and deeply intertwined with the nation’s political, economic, and cultural development. During the late Ming and early Qing dynasties, oppressive governance and excessive taxation led to social unrest, a decline in people’s livelihoods, and severe damage to agricultural production, which in turn devastated the animal husbandry sector. As state resources were increasingly diverted to the ruling class and military expenditures, the scope for the development of folk veterinary medicine diminished considerably, impeding the progress of traditional veterinary practice. In the early to mid-Qing period, the court implemented a policy of “prohibiting the common people from raising horses,” citing the dual rationale that “bandits would henceforth have no horses” and “warhorses would be easier to procure”.⁴⁸ This policy effectively suppressed the private horse industry. Concurrently, driven by shifts in the agrarian economy, the focus of veterinary medicine began to shift from horses to cattle care.

In 1736, Li Yushu revised and abridged the *Yuan Heng Liao Ma Ji*. Zhang Zongfa’s comprehensive agricultural work, *San Nong Ji* (Records of the Three Rurals), compiled in 1760, includes formulas for ailments affecting cattle, horses, pigs, sheep, and even poultry, dogs, and cats.⁴⁹ In 1785, Guo Huaixi further supplemented the *Yuan Heng Liao Ma Ji* with his *Xin Ke Zhu Shi Ma Niu Tuo Jing Da Quan Ji* (Newly Carved and Annotated Complete Collection of the Classics on Horses, Cattle, and Camels). By 1800, Fu Shufeng addressed limitations in the “*Cattle Classic*” appended to the *Yuan Heng Liao Ma Ji* and compiled the *Yang Geng Ji* (Collection on Nurturing and Plowing), which represents a notable development in Qing Dynasty veterinary development. The work documents cattle acupuncture techniques and 98 formulas for various ailments, proposing five essential diagnostic principles: discerning urgency, assessing severity, distinguishing between life and death, mastering difficulty, and integrating needling with medicine. Guided by the innovative concept that “the method is not difficult to apply and the challenge lies in recognizing the right moment to apply it,” Fu also developed surgical treatments for cattle, including the Huang-suspension method, Huang-piercing method, fire needling, and hot needling, which exerted a profound influence on veterinary medicine in the Qing Dynasty and beyond.⁵⁰

Other works from this period, such as the *Niu Yi Jin Jian* (Golden Mirror of Cattle Medicine), *Xiang Niu Xin Jing Yao Lan* (Essential Guide to the Heart-Mirror of Judging Cattle), and the *Bao Du Ji* (Collection on Calf-Rearing), reflect both the decline of horse medicine and the rise of cattle care. They also filled critical gaps in the diagnosis and treatment of cattle diseases in ancient veterinary practice.

Following the Opium War (1840), Western medicine began to be introduced into China, and TCVM found itself in a precarious position under the onslaught of Western ideology. During this period, TCVM was widely disparaged, and many folk veterinarians faced oppression. As explicitly stated in the preface to the *Zhu Jing Da Quan* (Complete Compendium of Swine Medicine), “veterinarians were looked down upon as practitioners of a minor craft, and thus no one had studied veterinary medicine for a long time”. Nevertheless, veterinarians, who originated from and served the common people, continued to be respected within their communities. Though they could not cure all livestock ailments instantly, their understanding of medical principles, specialized skills, and ability to diagnose pulses and administer effective treatments ensured their relevance. Despite the challenges, this period still saw the publication of numerous TCVM works.

In 1873, Li Nanhui compiled the *Huo Shou Ci Zhou* (Compassionate Boat for Living Creatures), which discusses two hundred forty diseases affecting various livestock, including yellow cattle, water buffalo, horses, pigs, sheep, dogs, and cats, and includes over seven hundred formulas. The work is notable for its practical content and local characteristics, and incorporates both experiential knowledge from the populace and the author’s own firsthand insights. It is one of the most comprehensive extant TCVM texts from this era.⁵¹ In 1891, Li Dehua and others expanded the *Zhu Jing Da Quan* (Complete Compendium of Swine Medicine), which includes fifty diseases of pigs and their corresponding formulas, accompanied by illustrations of the conditions. Covering common ailments such as swine fever, constipation, and coughing, it remains the only known extant TCVM monograph dedicated to the prevention and treatment of swine diseases.⁵² Other works from this period include the *Niu Ma Jie Jing* (Shortcuts for Cattle and Horses), and *Niu Jing Qie Yao* (Essential Guide to the Cattle Classic). These publications demonstrate that, even as it faced marginalization, TCVM was quietly consolidating its knowledge and laying a solid foundation for its future development.

The Modern Era

Western Medicine Introduced: Period of TCVM Decline

The history of TCVM in modern China is one of coexistence between Chinese and Western traditions. Beginning in the mid-19th century, with the arrival of Western veterinary medicine alongside colonial incursions, TCVM entered into a century-long period of collision and interaction with its foreign counterpart. The development of Western veterinary medicine in China commenced with the establishment of the Beiyang Army Equine and Veterinary School in 1904, marking the inception of formal veterinary education in the modern sense. Subsequently, specialized departments and colleges were established across the country to train professionals in Western veterinary science. For instance, in 1914, the Agricultural College of the Metropolitan University was renamed the Beijing Agricultural College, where a Department of

Animal Husbandry was created as a subdivision subordinate to the Agronomy Department, incorporating veterinary courses. In 1921, the Agricultural College of Southeast University established China’s first independent Department of Animal Husbandry.⁵³ These institutional developments signaled the birth of modern veterinary education in China.

Concurrently, new veterinary technologies introduced from the West were actively promoted, with rapid progress seen particularly in animal quarantine and vaccine development. In 1905, Shanghai implemented sanitary inspections of milk and established institutions for veterinary drug manufacturing and epidemic control. In 1918, Qingdao established a serum production facility under its Commodity Inspection Bureau. In 1924, the Beiping Central Epidemic Prevention Institute pioneered the development of diagnostic reagents for glanders and a rabies vaccine. In 1930, the Shanghai Commodity Inspection Bureau’s Serum Factory successfully developed an anti-rinderpest serum. By 1940, the Central Research Institute had established mobile teams for epidemic prevention and control.⁵⁴ Despite the establishment of numerous inspection and quarantine bureaus and the development of various biological agents, the social conditions of the time hindered the widespread dissemination and application of these advancements. Consequently, major epidemics such as rinderpest continued to affect livestock across vast areas of the country.⁵⁵

During this period of active development for Western veterinary medicine, TCVM faced severe opposition, and calls for its abolition even emerged, driven by a prevailing sentiment that uncritically favored foreign ideas and technologies. Consequently, TCVM suffered considerable setbacks. In contrast, in the last seventy-five years trends in veterinary education began to actively advocate for integration of TCVM and Western veterinary practices. This approach provided a lifeline for TCVM during the modern era and charted a viable path for the future development of veterinary medicine in China.

Post-1949: The Revival of TCVM

Following the founding of the People’s Republic of China in 1949, TCVM underwent a transformative revival. In October 1949, the former North China Ministry of Agriculture and Forestry was restructured into the Ministry of Agriculture under the Central People’s Government, establishing a Department of Animal Husbandry and Veterinary Medicine. This department, later upgraded to the General Administration and then the Bureau of Animal Husbandry, was tasked with managing and guiding the improvement of livestock breeding and veterinary disease control.⁵⁶ A pivotal moment came in 1956, when the State Council issued the directive “Strengthening the Work of Folk Veterinarians,” recognizing them as an indispensable force. The directive called for the establishment of robust veterinary organizations, enhanced political and technical education, and greater unity between practitioners of TCVM and Western veterinary medicine, advocating for mutual learning and the integration of strengths to advance the field collectively.⁵⁷ Described as a “milestone in 20th-

century TCVM development,” this policy marked a decisive shift for the discipline. TCVM not only rebounded from its prolonged decline but also achieved notable progress in theoretical innovation, clinical application, professional training, and international exchange, making significant contributions to the advancement of modern veterinary science.

From the 1950s onward, specialized institutions such as the Hebei TCVM School and the Gansu TCVM School were established, followed by the introduction of TCVM programs in universities nationwide, cultivating master’s and doctoral-level professionals. In 1956, the Chinese Academy of Agricultural Sciences founded the TCVM Research Institute, prompting provincial and municipal animal husbandry and veterinary research institutes to establish their own TCVM departments. The launch of professional journals, including the *Chinese Journal of Traditional Veterinary Science* and the *Journal of Traditional Chinese Veterinary Medicine*, provided vital platforms for academic exchange and knowledge dissemination. Following the outbreak of the Cultural Revolution in 1966, TCVM fell into paralysis, with scientific research and education coming to a standstill.

A large number of experts, including Ma Yuqing, a renowned TCVM specialist who had been received by China’s leaders, were compelled to leave their posts, and most theoretical research was interrupted. Driven by production needs and the policy promoting “local and traditional methods,” TCVM practice at the grassroots level nevertheless did not completely cease. In 1973, six cross-regional research collaboration groups integrating Chinese and Western veterinary medicine were established nationwide, promoting the development and application of TCM preparations and laying the foundation for the revival of TCVM.

After the reform and opening-up in 1978, numerous TCVM research societies and the Chinese Veterinary Medical Association were formed across the country, organizing academic conferences and promoting collaboration within the field. A proliferation of workshops, training programs, and the publication of textbooks, monographs, and clinical guidelines further enriched and systematized the discipline. During this period, ethnic minority veterinary traditions, as integral components of traditional medicine, also saw notable advancements in both theory and practice, demonstrating unique academic value and practical potential.

By the 1990s, however, China’s accelerated industrialization had led to the widespread replacement of livestock with machinery, and the shift from scattered household livestock rearing to concentrated, large-scale farming diminished the demand for traditional horse and cattle veterinary services. The TCVM profession was once again marginalized. Attracted by the prospects of modernization, many turned to fields such as mechanical engineering and business management, resulting in a notable decline of traditional veterinary talent. This prompted a shift in policy in China. In 2009, a pilot program for the licensed veterinarian qualification examination was launched,

accelerating the professional standardization of the veterinary occupation. Meanwhile, TCVM was increasingly integrated into university curricula, recognized as an intangible cultural heritage, and targeted for preservation and revitalization. Through these policy initiatives and the dedicated efforts of professionals, this ancient discipline has gradually re-emerged into the public consciousness.

TWENTY-FIRST CENTURY

TCVM Innovation and Current Practice

In the 21st century, shifts in social structure and farming practices have prompted corresponding changes in the focus and methodology of TCVM. In terms of patient demographics, the rising popularity of companion animals, including dogs, cats, reptiles, small mammals, and birds, and their increasing lifespans have led to a greater incidence of complex and chronic conditions. This has highlighted the limitations of a discipline historically centered on large livestock like cattle and horses, which struggled to meet the demands of modern intensive animal husbandry and the burgeoning urban pet economy. In response, TCVM has proactively reoriented its focus, gradually expanding into the companion animal healthcare market.

Concurrently, the intensification of disease prevention and control in modern, large-scale farming operations has presented new challenges. In such settings, where animals share similar environments, exhibit minimal individual variation, and face uniform disease risks, the TCVM approach of individualized pattern differentiation, tailored to the specific symptoms and constitution of a single animal, has proven inefficient and less applicable. Consequently, modern TCVM has evolved beyond the paradigm of individual “syndrome differentiation” to embrace a concept of “group pattern differentiation,” treating a cohort of animals within a shared husbandry system, and thus sharing a common disease etiology, as a single diagnostic entity.⁵⁸

Furthermore, TCVM has found application in diverse fields such as wildlife rescue, the conservation of endangered species, and the health management of zoo animals. These expanding application scenarios underscore the discipline’s potential to enhance animal welfare and support biodiversity conservation. These developments demonstrate that TCVM is actively seeking broader developmental space and application potential, exhibiting a multifaceted and cross-disciplinary growth trajectory.

TCVM Innovation in Companion Animal Healthcare

With the deepening societal recognition of the interconnection between pet health and human well-being, TCVM has demonstrated unique value in the field of pet healthcare. Studies comparing pet owners and non-pet owners indicate that the former generally exhibit a higher quality of life, particularly in terms of daily activity level, with a majority acknowledging the positive impact of pet ownership on mental health.^{59,60} Currently, the number of pet owners continues to rise, and the lifespan of pets has significantly increased. According to the *2025 China Pet Industry White Paper*, the number of dogs and cats in China

has reached 124 million, with senior dogs aged seven and above accounting for 23% of the total. Over the next three years, more than 30 million pets are expected to enter middle and old age.⁶¹ In this context, TCVM has demonstrated considerable efficacy in treating age-related, chronic, and long-term conditions in pets through its unique diagnostic and therapeutic approaches.⁶² These methods are increasingly recognized and favored by pet owners. For instance, the combination of *Si Ni* Decoction and acupuncture has shown promising results in treating convulsive disorders in elderly dogs.⁶³ The modified *Ba Zhen* Decoction has been used to address chronic epistaxis in dogs.⁶⁴ Incomplete statistics indicate that by 2022, TCVM interventions had achieved a cure rate exceeding 50% for conditions such as canine paralysis, geriatric constipation, and diarrhea, while integrated Chinese-Western veterinary approaches yielded success rates of approximately 60% in treating severe viral diseases like canine distemper and infectious canine hepatitis.⁶⁵ These outcomes not only highlight the advantages of TCVM in managing a wide range of pet diseases but also underscore its expanding application within the companion animal healthcare industry.

In recent years, the increasing species diversity within the pet market has seen the rise of “exotic pets” such as rabbits, snakes, lizards, and turtles, which have become popular choices for many households.⁶⁶ A growing number of cases now document the successful treatment of these animals using TCVM. Examples include the use of *Dang Gui Cong Rong* Decoction combined with acupoint massage to treat constipation in pet rabbits.⁶⁷ A modified *Ba Zheng* Powder was applied to address selamectin poisoning in rabbits.⁶⁸ In another case, an herbal formula containing *Chen Pi* (Aged tangerine peel) and *Ban Xia* (Pinellia rhizome) was administered to treat pneumonia in a royal python attributed to External Cold, with the treatment aimed at ventilating the Lung, resolving Phlegm, boosting *Qi*, and fortifying the Spleen.⁶⁹ Given the distinct physiological structures and behavioral habits of exotic pets compared to traditional companion animals, Western pharmaceutical treatments often face limitations and carry higher risks. This has led to a sustained increase in demand for TCVM within the exotic pet sector, propelling the discipline onto a new and accelerated path of development.

TCVM Innovation in Livestock Production

In the realm of commercial livestock production, the holistic perspective and preventive ethos of TCVM, epitomized by the principle of “treating disease before it arises”, align well with the priorities of modern intensive farming systems, which emphasize overall herd health and proactive disease management. By reducing reliance on chemical pharmaceuticals while enhancing animal immunity and disease resistance, TCVM contributes to safeguarding both animal welfare and product quality.⁷⁰ This synergy supports the broader goals of green and sustainable development in contemporary animal agriculture, thereby facilitating the widespread adoption and promotion of TCVM practices in this sector.

Application of TCVM in the Management of Viral Diseases

Chen et al. reported that combining acupuncture with *Jing Fang Bai Du* Powder significantly alleviated clinical symptoms and reduced complications in cattle with influenza, yielding notable clinical outcomes.⁷¹ Additionally, herbal medicine formulas containing *Huang Qin* (Baikal skullcap), *Da Huang* (Rhubarb), and *Sheng Di* (Chinese foxglove) have been shown to modulate inflammatory cytokine levels and enhance immune function in calves and cows affected by bovine viral diarrhea.⁷² Studies of this kind have demonstrated that TCVM exhibits definite efficacy in combating many viral animal diseases.

TCVM Management of Bacterial Diseases

Wu et al. demonstrated that an herbal medicine formula comprised of *Huang Lian* (Goldthread), *Shi Da Gong Lao* (Fortune’s mahonia), and *Mu Xiang* (Costus root) significantly improved clinical symptoms and weight gain in chickens infected with *Escherichia coli*.⁷³ Chen indicated that supplementing poultry feed with an appropriate amount of *Huang Qin* (Baikal skullcap) extract effectively alleviated the clinical manifestations of necrotic enteritis caused by *Clostridium perfringens*.⁷⁴ In treating lamb dysentery induced by *Clostridium perfringens* type B, dry needling acupuncture (DNAP) at the *Hou-hai*, *Guan-yuan*, *Yu-hou*, *Zu-san-li*, and *Pi-shu* acupoints, combined with aqua-acupuncture (Aqua-AP) at the *Bai-hui* and *Hou-hai* acupoints, resulted in significant symptomatic relief.⁷⁵ These findings collectively affirm efficacy of TCVM in managing bacterial diseases in livestock and poultry. Such applications not only align with policies advocating reduced antibiotic use but also contribute substantially to promoting green animal husbandry and ensuring food safety.

TCVM Management of Parasitic Diseases

The impact of parasitic diseases on livestock and poultry production is comparable to, if not greater than, that of bacterial and viral infections, often characterized by greater concealment and persistence. Parasites residing within the host continuously deplete nutrients, leading to malnutrition, stunted growth, anemia, and compromised immunity, ultimately reducing productivity and causing significant economic losses. TCVM also addresses parasitic diseases, and although some herbal formulas may not achieve the precise, targeted efficacy of certain Western anthelmintics, they demonstrate notable success in disease prevention. Tian et al. found that the herbal medicine formula “*Xiang Qi* Decoction” effectively reduced pro-inflammatory cytokine levels while enhancing anti-inflammatory factors and antioxidant enzyme activity, significantly mitigating cecal mucosal damage caused by multidrug-resistant *Eimeria tenella* in chickens.⁷⁶ Shen revealed that extracts of *Bing Lang* (Areca nut), *Wu Mei* (Smoked plum), *She Chuang Zi* (Cnidium fruit), *Ku Shen* (Flavescent sophora root), and *Lei Wan* (Stone-like omphalia) exhibited lethal or inhibitory effects against *Giardia lamblia* through distinct mechanisms.⁷⁷ Guo et al. successfully employed an herbal medicine formula containing *Bing Lang* (Areca nut) and *Ku Lian Zi*

(Chinaberry fruit) for the deworming of horses infected with *Parascaris equorum*, achieving excellent results and circumventing the issue of ivermectin resistance.⁷⁸

Application of TCVM in Wildlife

TCVM plays a significant role in wildlife medicine, providing therapeutic approaches such as acupuncture and herbal medicine for disease management, while also utilizing herbal medicine preparations to enhance survival and improve disease resistance. Zhang et al. noted that stress-related conditions are common among captive wildlife in zoos. Their research demonstrated that prophylactic administration of targeted Chinese herbal medicine formulations effectively boosted animal immunity. This approach is time- and cost-efficient, avoids adverse side effects, and helps prevent the onset of stress-induced illnesses that can result from other treatment methods.⁷⁹ Fu et al. developed an herbal medicine formula composed of *Huang Qi* (Milkvetch root), *Yin Yang Huo* (Epimedium), *Hong Jing Tian* (Rhodiola), *Gou Qi Zi* (Goji berry), prepared *He Shou Wu* (Prepared fleeceflower root), and *Ren Shen* (Ginseng). The formula significantly improved immune function in elderly South China tigers with Kidney Deficiency, contributing to prolonged survival in this critically endangered species.⁸⁰

Acupuncture is also increasingly applied in the healthcare of non-domesticated animals. Although the precise Meridian and acupoint locations for many wild species remain undocumented, studies suggest that by extrapolating from the anatomical knowledge of domestic animals, approximate acupoints can be identified and effectively stimulated in species as diverse as elephants, rodents, birds, turtles, and even fish, yielding positive therapeutic outcomes.⁸¹

Biotechnology Insights into TCVM Theory

Biological techniques are founded on the principle of “evidence-based practice,” emphasizing that all diagnostic and therapeutic decisions must be grounded in rigorous, reliable scientific evidence. Consequently, TCVM has actively integrated with contemporary veterinary science, incorporating advanced technologies such as molecular biology and genomics to elucidate its theoretical foundations, investigate the mechanisms of action of herbal medicine, and develop new veterinary drugs from traditional sources.⁸² Currently, research on the active components of herbal medicine has become a prominent field. Studies indicate that astragalus polysaccharides, active constituents derived from *Huang Qi* (Milkvetch root), significantly enhance the immunomodulatory activity of macrophages and dendritic cells.⁸³ Magnolol, extracted from *Hou Po* (Magnolia bark), and allicin, derived from garlic, have been shown to act synergistically with cefquinome, reducing the drug resistance of multidrug-resistant *Escherichia coli*.^{84,85} A research team led by Jin at Huazhong Agricultural University discovered that berbamine hydrochloride, isolated from *Huang Lu Mu* (Smoke tree), exhibits direct antiviral activity against African swine fever virus.⁸⁶ *Ban Lan Gen* (Isatis root) polysaccharides interact with

Toll-like receptor 3 (TLR3) and Toll-like receptor 4 (TLR4) on porcine alveolar macrophage 3D4/21 cells expressing the hemoglobin scavenger receptor CD163, thereby modulating innate immune signaling pathways mediated by these receptors. This promotes the secretion of type I interferons, thereby alleviating the immunosuppressive state in the early stages of porcine reproductive and respiratory syndrome virus (PRRSV) infection and inhibiting viral replication.⁸⁷ Lin et al. found that allicin significantly suppresses the expression of genes associated with the adhesion, invasion, and regulation of *Haemophilus parasuis*.⁸⁸ These and similar studies on the active components of herbal medicine are gradually clarifying the mechanisms by which they exert their therapeutic effects. This progress not only advances the scientific validation of TCVM but also opens new avenues for the research, development, and application of TCVM.

On the other hand, TCVM has also embraced advanced detection technologies and equipment to provide a more scientific, convenient, and accurate basis for diagnosis, treatment, and research. Among the most mature and widely adopted TCVM therapeutic devices is electro-acupuncture (EAP), which integrates traditional needling with electrical stimulation. By applying pulsed currents of varying waveforms, intensities, and frequencies to acupoints, EAP modulates the body's *Yin-Yang* balance to treat disease.⁸⁹ For instance, flaccidity syndrome, a clinically challenging condition classified into four distinct patterns, can be effectively managed with EAP. Tailoring the stimulation to specific acupoints along relevant Meridians for each pattern has yielded positive therapeutic outcomes.⁹⁰

Furthermore, the application of modern analytical techniques such as high-performance liquid chromatography (HPLC) and mass spectrometry has enabled more accurate and efficient separation, identification, and quantification of active components in TCM. The use of chromatographic fingerprinting ensures the authenticity, stability, and consistency of herbal quality.⁹¹ Superfine grinding technology enhances the bioavailability of active constituents.⁹² Nanotechnology facilitates the targeted delivery of herbal extracts to specific organs and cells, enabling precise drug administration.⁹³ These and other technological advancements have infused new vitality into the development of TCVM.

CHALLENGES AND SOLUTIONS IN TCVM

Scientific progress is relentless, and in the current era of rapid globalization and technological advancement, TCVM, an ancient discipline spanning millennium, inevitably faces multifaceted challenges arising from modern veterinary theories, technologies, and shifting societal attitudes.

Compatibility of TCVM Theory with Modern Science

Modern science emphasizes verifiability and falsifiability. In contrast, the theoretical framework of TCVM, forged over millennia and centered on concepts such as *Yin-Yang* and Five Elements, the *Zang-fu* organs and Meridians, and a Holism, does not readily conform to

these modern scientific criteria. Core tenets like *Yin-Yang* and Five Elements, as well as the *Zang-fu* and Meridian systems, lack direct support from modern anatomy and biochemistry. Diagnostic methods such as the four examinations rely heavily on clinical experience, making standardization and objective assessment challenging. Furthermore, the complex composition of TCM formulas complicates the elucidation of their mechanisms of action using contemporary pharmacological principles. These and other issues have impeded the modernization of TCVM.

In response, TCVM research has shifted its focus toward the scientific reinterpretation of its theoretical foundations. In studies aimed at providing modern explanations for TCVM theories, Goldberg et al. interpreted the *Yin-Yang* doctrine by examining fluctuations in cAMP and cGMP levels.⁹⁴ Yang constructed a state-transition model to demonstrate the logical relationships embedded within the theory of *Yin-Yang* and Five Elements.⁹⁵ Zhang et al. explored the theory that “the Kidney governs growth and development” from a genetic perspective.⁹⁶ Luo identified a functional network characterized by dynamic, cell migration-based communication along Meridian pathways, proposing this as a potential explanation for the Meridian system.⁹⁷

In the current era of rapid artificial intelligence (AI) advancement, AI-assisted diagnosis in TCM has emerged as a prominent research focus. Research in this area concentrates on collecting and standardizing multi-dimensional patient data, including symptoms, signs, and observations of the tongue and pulse. By leveraging large datasets derived from classical texts, textbooks, and clinical records, machine learning algorithms and deep learning techniques are employed to construct knowledge graphs and intelligent pattern differentiation models. These systems enable comprehensive and accurate diagnosis through integrated analysis.⁹⁸ The maturation of this technology can mitigate diagnostic errors arising from subjective interpretation by practitioners and address the lack of uniform standards in traditional diagnostic methods. It is anticipated that AI technology will soon find application in the field of TCVM as well.

The establishment of network pharmacology databases for herbal medicine, combined with bioinformatics techniques, offers a pathway to clarify the unclear mechanisms of action of complex TCVM herbal medicine formulas.⁹⁹ The TCM Systems Pharmacology Database and Analysis Platform (TCMSP), a widely used tool in the field, integrates extensive information on herbal components, pharmacokinetic properties, and their molecular targets.

It enables researchers to rapidly analyze the therapeutic effects of herbal medicine. When combined with other bioinformatics methods, such as the construction of visual drug-target-disease networks, this approach effectively reveals the characteristic multi-component, multi-target, and multi-pathway synergistic actions of herbal formulas.¹⁰⁰ Such platforms have become indispensable research tools in the study and development of TCVM.

Social Perception Limitation and TCVM Applications

In contemporary Chinese society as in the Western hemisphere societies, Western veterinary medicine remains the dominant paradigm. Its widespread use in commercial livestock production is driven by the low cost and rapid efficacy of Western pharmaceuticals. Similarly, in the companion animal healthcare sector, pet owners often prioritize Western veterinary medicine due to its diagnostic clarity and systematic approach to emergency care. TCVM, by contrast, is frequently relegated to a last-resort option for complex or intractable conditions. Nevertheless, some individuals, both within China and abroad, continue to doubt the efficacy of TCM, suggesting that TCVM acupuncture operates akin to a placebo effect.^{101,102} These views underscore a significant deficit in public understanding of TCVM and highlight the considerable work required to foster greater cultural acceptance among consumers.

A more accurate public perception of TCVM is needed. Many people still associate the discipline with outdated stereotypes, such as assisting in the delivery of calves and foals or treating dystocia, overlooking its ongoing evolution. While TCVM focused on large livestock like cattle and horses, it has increasingly transitioned to also serving the health needs of small companion animals. Public misconceptions about TCVM often fall into two extremes: one camp subscribes to the notion that “TCVM is ineffective,” while the other believes it can “cure all diseases.”¹⁰³ The long history of successful TCVM interventions, documented in numerous case studies, demonstrates that its therapeutic outcomes are not merely coincidental. At the same time, TCVM is not a panacea, and any perception that deifies the discipline is equally misguided. Like modern veterinary medicine, TCVM is a field in constant development. It should not be wholly affirmed or dismissed based solely on differences in its theoretical framework or therapeutic mechanisms compared to its Western counterpart.

THE INTERNATIONAL DISSEMINATION OF TCVM

The internationalization of TCVM has evolved into a multidimensional and systematic development landscape. Since its establishment in 1974, the International Veterinary Acupuncture Society (IVAS) has expanded to include members from over 40 countries.¹⁰⁴ In 1987, the First International Veterinary Acupuncture Conference, hosted by Professor Yu Chuan in Beijing, attracted veterinarians from more than ten countries. The Asia Society of Traditional Chinese Veterinary Medicine (ASTCVM, founded in 2005) promotes regional cooperation through academic conferences and standard-setting initiatives, while the founding of the World Association of Traditional Chinese Veterinary Medicine (WATCVM) in Spain in 2013 further marked the global recognition of TCVM as an important discipline within veterinary medicine.¹⁰⁵ In the field of education, Chi University, which was founded by Xie Huisheng in the USA, has trained over 12,000 veterinarians from more than 80 countries

and regions through multiple learning programs.¹⁰⁶ Additionally, respected education institutes in China, including China Agricultural University, Northwest A&F University and Nanjing Agricultural University, have continuously cultivated international talent by enrolling international students, organizing international training workshops, and engaging in collaborative research. Together, these efforts have built a comprehensive international dissemination system encompassing academic organizations, educational institutions, and research platforms.

FUTURE DIRECTIONS AND PROSPECTS FOR TCVM

Historically practiced in livestock/production animal species (e.g. horses, cattle), TCVM has expanded to include companion animal medicine while continuing to retain its relevance in large-animal practice. Seizing the opportunities presented by the expanding pet healthcare market will be crucial for achieving a qualitative leap in the development of TCVM. On one hand, the field must continue to elevate its professional standards by conducting and supporting hypothesis driven evidence-based research, systematizing effective treatment protocols, improving cure rates, and earning the trust of pet owners. On the other hand, TCVM cannot develop in isolation. It should actively integrate advanced diagnostic technologies from modern medicine, such as imaging and blood work, to provide a more comprehensive basis for the accurate disease diagnosis.

Furthermore, the TCVM sector must prioritize talent cultivation and knowledge transmission. The *Three-Year Action Plan for Promoting the Development of TCVM Talent* issued by the Chinese Veterinary Medical Association explicitly emphasizes the need to build a systematic, multi-tiered talent pipeline, ensuring a steady influx of qualified professionals into society and paving the way for comprehensive coverage of TCVM services at the grassroots level. Concurrently, veteran TCVM practitioners should be encouraged to mentor the younger generation, passing on their rich clinical experience to ensure the discipline's continuity.

Strengthening industry-academia collaboration is also essential for translating research outcomes into practical applications. For enterprises to establish a sustainable market advantage and mitigate risks, they must develop proprietary intellectual property and enhance their core technological innovation capabilities, which depend on robust research and development (R&D) teams.¹⁰⁷ Universities, in turn, rely on industry partnerships to cultivate graduates who meet market demands. Fostering deep cooperation between enterprises, universities, and research institutions will accelerate the transformation of laboratory discoveries into market-ready products, address pressing needs in the veterinary sector, and create a win-win dynamic that fuels the vigorous growth of the TCVM industry.

Animal diseases are increasingly characterized by complexity and diversity. As a result, treatment modalities relying solely on either Western or traditional Chinese

veterinary medicine are struggling to meet the demands of the industry. Consequently, the integration of TCVM and Western veterinary practices has emerged as an essential strategy to address these evolving needs, giving rise to the concept of integrative veterinary medicine; a comprehensive approach that combines conventional veterinary practice with complementary and alternative therapies.¹⁰⁸

Integrative veterinary medicine leverages the respective strengths of TCVM and modern veterinary science to provide more holistic and effective treatment protocols, positioning itself as one of the most promising methods for disease prevention and management.¹⁰⁹ In recent years, a growing number of researchers have dedicated their efforts to exploring and applying this novel paradigm. For instance, Zhang achieved positive outcomes in treating feline megacolon by combining purgative herbal formulas with glycerin enemas.¹¹⁰ Ge demonstrated the efficacy of administering seasonally adjusted herbal medicine formulas alongside intramuscular tylosin injections for the treatment of swine mycoplasmal pneumonia.¹¹¹ Wang et al. reported significantly improved recovery rates in dogs with intervertebral disc disease by integrating EAP, which stimulates Meridians, with Western medications such as antibiotics, glucocorticoids, and vitamins to control inflammation and reduce edema.¹¹² Furthermore, the *Hui-yang-jiu-zhen* (restore the Yang by using nine acupoints), a classic acupuncture technique employed in TCVM emergencies, can facilitate rapid recovery in dogs and cats during the perioperative period, thereby enhancing anesthesia safety.^{113,114} These examples illustrate that integrative veterinary medicine has become a major trend in the industry's development. Moving forward, it is imperative to further promote mutual accommodation between TCVM and modern veterinary medicine at the theoretical level, foster synergistic innovation in technology, and deepen clinical integration to construct a more comprehensive, versatile, and practical veterinary healthcare system for the new era.

CONCLUSION

As a treasured legacy of Chinese traditional culture, TCVM has, over millennia, developed a distinctive theoretical framework and a rich repertoire of diagnostic and therapeutic techniques. Contemporary research has made significant strides in elucidating classical theories, deciphering the mechanisms of Chinese herbal medicine, and exploring the principles underlying acupuncture, thereby advancing the modernization and scientization of the discipline. Confronted with the challenges of the modern era, TCVM has proactively sought solutions and is steadily progressing toward its developmental goals. Looking ahead, the continued evolution of TCVM must adhere to the principle of "preserving the essence while fostering innovation." This entails upholding its core tenets and leveraging its inherent strengths while embracing modern scientific and technological tools to refine its therapeutic systems. It also requires actively promoting the

complementary relationship and integration of TCVM and Western veterinary practices. Only by doing so can this ancient discipline be revitalized, better serve the needs of animal welfare, and contribute its unique Eastern wisdom to the global “One Health” ecosystem.

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