Chapter 09

Botanical Elixirs and Ancient Wisdom against Rinderpest in Buffalo

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ABSTRACT

Rinderpest, sometimes referred to as bovine plague, is a contagious viral illness that mostly affects animals with cloven hooves, such as cattle and buffalo. Famine and poverty are widespread over the continent due to a terrible sickness that affects cattle. It is a viral illness that affects cattle and other ruminants, both domestic and wild. It is characterized by high morbidity and mortality rates, fever, and erosive stomatitis. Animals having the virus can effectively contact susceptible animals to spread rinderpest. The World Organization for Animal Health and the UN Food and Agriculture Organization declared the worldwide elimination of rinderpest in 2011 the greatest veterinary accomplishment of our time and just the second disease to be eradicated culminating centuries of veterinary progress. If the virus were to unintentionally or deliberately escape from high-containment storage facilities, rinderpest would still need to be reported to the OIE, and sufficient surveillance mechanisms would need to be kept in place to guarantee the early identification of clinical cases.

KEYWORDS
Botanica,l Elixirs, Ancient Wisdom, Rinderpest in Buffalo

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INTRODUCTION

A member of the Paramyxoviridae family of morbilliviruses, which is the cause of rinderpest, often known as the cattle plague (Schmitz et al., 2024). Both the Peste des petits virus (PPR) and the measles virus are closely related to the rinderpest virus, which mostly affects ungulates, both domestic and wild. Viruses belonging to the family Paramyxoviridae, genus Morbillivirus, are significant pathogens that cause acute, life-threatening illnesses in animals. The host specificity of other related viruses remains unclear and is primarily determined by the genera to which they were initially linked (Hinds et al., 2024). These include the canine distemper virus, which affects several other carnivore families and has been linked to epidemics in African lions and pinnipeds, the phocid distemper virus, the cetacean morbillivirus, the measles virus in humans, and the recently identified felid morbillivirus (Libbey et al., 2023). In addition to causing high rates of morbidity and mortality from oral and gastrointestinal tract ulceration, diarrhea, dysentery, dehydration, protein loss, and immunosuppression from lymphocyte depletion, reinfection in cattle and buffaloes is characterized by fever with ocular and nasal discharges. Rinderpest (RP) epidemics devastated three continents for centuries, killing millions of cattle, buffalo, yaks, and other species (Aslam and Alkheraije, 2023). In the late 1800s and early 1900s, RP destroyed between 80% and 90% of Africa's cattle, or hundreds of millions of animals, and severely damaged livestock in Asia, the Middle East, and Europe (Kroon, 2024). This destruction caused widespread malnutrition and famine, as well as the incapacitating incapacity of hundreds of villages, to use draft animals for farming work (Cobbing, 2024). Worldwide, people have been promoting health and wellness with botanical elixirs for ages. The practice of spagyrics, which was founded in the early 1500s by the Swiss physician Paracelsus, entails the alchemical processing of plants and herbs into elixirs (Seger, 2022). For thousands of years, people have used herbal and botanical items to either prevent or treat illnesses. Botanical medicine has recognized the contributions of Asian and Native American cultures worldwide (Bhattacharjee et al., 2024). Less than 300 herbs and botanicals are routinely utilized in Western medicine, although an estimated 30,000 or more have been investigated for their potential medical benefits. Plants are probably naturally used to treat or prevent illness (Ahmed et al., 2024). In a world devoid of prescribed drugs, people looked around them to discover remedies for illnesses (Nwanaji-Enwerem et al., 2024). The works of Hesiod and Hippocrates, who detailed the use of herbs in the fourth century B.C., provide documentation of the benefits of herbs as early as the eighth century B.C. The first professional organization dedicated to

the study of botanical medicine was the National Institute of Medical Herbalists, which was founded in 1864. All civilizations and ethnic groups have utilized plants medicinally for a very long time to promote human health (Li et al., 2024). It is the most ancient type of medicine that humans are aware of (Finch and Burstein 2024). The FDA's guidance on botanical drug products states that herbal items meant for therapeutic, preventive, mitigating, or diagnostic purposes are considered drugs (Faqi, 2024). A botanical product may be controlled as a medication or as a food supplement, depending on the situation, if its goal is to alter the composition or operation of the human body.

An elixir is a sweet beverage that is ingested internally and used medicinally to treat illnesses (Ungerer, 2024). An elixir is a pharmacological preparation that has at least one active component that is meant to be consumed orally (Barik and Dhar, 2024). The FDA defines a botanical medicine product as one that is made of vegetable materials, which can include plant materials, algae, macroscopic fungi, or combinations of these; it is meant to be used in the identification, treatment, mitigation, or prevention of human disease. Botanical medication products can be found in various forms such as tea, powder, pill, capsule, elixir, topical, injectable, and more.

Ancient Wisdom in Veterinary Practices

Plant-based medicines have been used since the prehistoric era, which dates to 4000–5000 BC (Barrett et al., 2024). Approximately 80% of the developing world still depends on plants for treatment, despite the modern period (Bell et al., 2024). It is interesting to remember that more than 50% of the medications used in clinical practice today have plant origins. The ancient Ayurveda, sometimes known as the science of life, included veterinary practices (Scanlan, 2024). Cattle were valued belongings and sacred creatures during the Vedic era (c. 1500–500 BCE), and early animal clinics and sanctuaries were devoted to them.

Early treatises also addressed the Asian elephant, which was valued for its mobility and military prowess, although many species had well-developed treatment techniques (Collins, 2024). The emperor Ashoka the Great funded the first Ayurvedic veterinary facilities during this period when veterinary activities were funded by the state. Ashoka's purported spiritual motive stemmed from the idea that dharma practice connected animal and human welfare (Bilimoria and Rayner, 2024). As a result, early veterinarian and medical practice was linked to spiritual beliefs and holy rites in a sacred society, where institutional veterinary activity originated. Via Buddhist writings, Ayurvedic notions about physiology, health, and illness made their way from India to China, where they were subsequently connected to local conceptions of human and animal bodies in the setting of religion (Geisshuesler, 2024). In the ancient Arab and Mediterranean countries, medical and veterinary procedures were initially associated with religious rites. Secular medicine based on natural notions of health and disease also arose, even if religion and rituals remained important in medical treatments (Shaikh et al., 2024). As early as 130 BCE, regular hote-doctors were described in ancient Greek treatises, with "Metrodoros" being named among them.

Veterinarius and mulomedicus were the titles of animal healer professionals in the Roman Empire (Jones and Koolmees, 2022). The term "veterinarian" was used by the Roman scholar Publiush Vegetius Renatus (c. 385 CE) in his writings; Arabic scholars translated this to "bitar" or "baytar," signifying an animal surgeon (particularly a horse surgeon). Based on the revered notion that humans and animals are interconnected, Islamic medicine, both human and veterinary, rose to prominence as the most developed model globally for centuries (Riordan and Flood, 2024). Ibn Akhī Hizām, commander and stable master under caliph Al-Mu 'tadid (r. 892–902), made significant contributions to veterinary medicine. Kitāb al-Furūsiyya wa 'l-Baytara (Book of Horsemanship and Hippiatry) is a work authored by him. Later, in his Kitāb al-Baitara (c. 1209), Ahmad ibn al-Hasan included camel, horse, cattle, and sheep medicine. Tenth-century Hippiatrica was a key medieval source for the dissemination of veterinary knowledge (Bouras-Vallianatos, 2024).

Understanding Rinderpest in Buffalo

Native to Asia, buffaloes (Bubalus bubalis) were then introduced to Africa, Europe, Oceania, and finally the American continent, where they are now found in the United States, Argentina, and Brazil (Martínez-Burnes et al., 2024). The buffalo population has increased and is now widespread throughout the American continent. The world's population was estimated by the FAO to be 206.6 million in 2018 (Kumar et al., 2024). With an estimated 208,098,759 heads, and 77 nations with buffalo herds (Minervino et al., 2020). Worldwide, the fastest-growing buffalo production systems are found in Latin America (Eyasmin and Ghosh, 2024). An RNA virus belonging to the family Paramyxoviridae and genus Morbillivirus is the cause of rinderpest (Alemu, 2024). Its virulent variants can cause up to 77% of morbidity and mortality in India, while mild strains can also cause varied levels of illness and death (Zhu et al., 2024). Sheep, goats, cattle, water buffalo, and wild animals are all impacted. It poses no risk to the public's health and does not affect humans (Ayejoto and Egbueri, 2024). The vulnerability of buffalo varies; species from the Far East seem to be particularly vulnerable, while Egyptian and Turkish buffalo seem to be rather resistant (Wankar et al., 2024). Indian buffaloes are three times more vulnerable than cattle, which may be because certain viral strains are host-specific (Khan et al., 2024). This virus is never reported in Australia, New Zealand, and America. Both direct and indirect contact with secretions, urine, feces, vaginal discharge, and milk can spread the virus (Shekhar, 2024). The upper or lower respiratory tract's epithelium is the primary target of attack. Buffaloes have an incubation period of 3–7 days, though this might vary depending on the individual's natural resistance (Chauhan et al., 2024). Buffaloes with rinderpest exhibit fever (40–42 ◦C), depression, anorexia, decreased rumination, rough coats, and elevated heart and respiratory rates. Within two to three days, there is anorexia, necrosis, erosion of the oral mucosa, and congestion of the mucous membranes together with acute mucopurulent tearing and copious salivation (Pepper, 2024).

Thereafter, there is widespread hemorrhagic diarrhea accompanied by mucous and necrotic material. Within seven to twelve days, severe tenesmus, hypothermia, decubitus, weakness, breathing difficulties in the abdomen, dehydration, and even mortality are possible (Jatav et al., 2024). There have been reports of an unusual form even with nerve symptoms and miscarriage in young and neonatal animals, as well as a per acute form (Calado et al., 2024). Latent infections increase vulnerability to other infectious agents due to the lymphotropic impact of the virus. Hemorrhages, necrosis, erosions of the mouth, gut, and respiratory tract, as well as lymphadenomegaly with edema, dehydration, and emaciation, are the typical lesions (Chang et al., 2024).

Traditional Remedies for Rinderpest

Acute and highly contagious, rinderpest is a viral illness that affects cattle, tamed buffalo, and certain wildlife species (Odetokun et al., 2024). One of the deadliest diseases affecting cattle is classical rinderpest, which can seriously harm unsuspecting herds (Yadav et al., 2024). Rinderpest epidemics were common across Eurasia in the past. In the beginning, 90% of the cattle in sub-Saharan Africa perished. Populations of wild buffalo, giraffes, and wildebeest were wiped out (Kock, 2023). A third of the human population in Ethiopia and two-thirds of the Maasai tribe in Tanzania perished from mass famine brought on by the loss of plow animals, herds, and hunting (Mniga, 2024). Thickets developed in grasslands as a result of the decrease in the number of grazing animals (Gxasheka and Dlamini, 2024). These thickets served as tsetse fly breeding grounds, which led to a human sleeping sickness outbreak (Gachoki, 2005). Others believe that this disease is the worst natural disaster to ever strike Africa. On the other hand, it must be taken into account while making a differential diagnosis for erosive and ulcerative illnesses across the past, rinderpest was found across Asia, Africa, and Europe (Singh et al., 2024). There have never been rinderpest epidemics in the Americas or Oceania (Toor et al., 2024). Sanitary prophylaxis should be undertaken, with isolation or sacrifice of sick and in-contact animals, destruction and careful disposal of carcasses and infectious debris, and protection of unaffected regions, since there was no specific treatment available only supportive care for diarrhea and fluid loss. The same preventative measures that are used in nations where foot-and-mouth disease is listed as an alien illness also apply to free countries (Oda et al., 2024). The attenuated virus strain vaccination is utilized in places deemed epizootic; it delays immunity but remains effective for life, and it can be re-administered in areas of concern. Historically, vaccination campaigns have resulted in a global drop in rinderpest prevalence. Heat-stable recombinant vaccines are also advised by the OIE (Fanelli et al., 2024). The 1980s saw the launch of the Global Rinderpest Eradication Program (GREP) (Jain, 2023). The Food and Agriculture Organization of the United Nations (FAO), in partnership with the World Organization for Animal Health (WOAH) and significant contributors like the European Commission, launched the GREP in 1992. Over time, the program gradually decreased the number of nations affected by the illness; the most recent outbreak occurred in Kenya in 2001 (Abboud et al., 2024). In 2011, rinderpest was officially declared eradicated worldwide, marking the first instance of an animal disease being eradicated in human history (Mashinagu et al., 2024). Animals infected with rinderpest that recovered have gained immunity for life (Bhagwat and Gurav, 2024).

Modern Applications of Botanical Elixirs

The last several decades have seen a sharp increase in interest in the use of traditional herbal medicines as a sort of life-giving elixir (Sørensen, 2024). This interest can be attributed to scientific evidence supporting the therapeutic efficacy and patient-friendliness of traditional medicines (Zhang et al., 2024). Because Chinese and Indian medical systems have access to more traditional knowledge than those of other nations, there has been a preference for using those (Liu et al., 2024). With its abundant biodiversity and longstanding reputation in the medical community, India has the potential to make a significant contribution to the global system that sustains life (Landrigan et al., 2024). Several species of medicinal plants have been used for millennia to treat 80% of human ailments worldwide (Nenungwi et al., 2024). Even though traditional herbs are still used extensively throughout the world, the current study looks into the possibility of some species having novel Ayurvedic and pharmacological uses (Uthara, 2024). Numerous studies show that natural remedies, with their antibacterial, anti-inflammatory, and antioxidant qualities, are essential for treating a wide range of illnesses. Differentiated mechanisms from a variety of herbal plants efficiently fight bacteria, providing a useful remedy for patients who are resistant to antibiotics (Nasrollahian et al., 2024). According to in-vitro research, the herbal chemical complex not only shows promise in treatment but also offers benefits including decreased toxicity and a decreased chance of resistance developing (Chaudhary et al., 2024). Phytochemicals, which include a variety of compounds such as tannin, tocopherol, quinine, quercetin, and alkaloids, have been shown to have substantial promise in treating patients' ailments. Botanical elixirs have a wide range of purposes in modern times, from sports nutrition and detoxification to cleansing cosmetics and skin care products to functional drinks (Toor et al., 2023). Herbs such as fennel, ginger, and peppermint can be added to botanical elixirs to help buffalo's digestive systems function better. By addressing problems like gas, bloating, or indigestion, these herbs can enhance digestive health in general. Throughout the world, the use of herbal plant-based remedies has increased during pandemics like COVID-19, Zika, Ebola, etc (Tulsawani et al., 2024). The history of this practice begins with the Egyptians, who were the first to use plants as medicine. The Greeks and Romans carried on this tradition and recorded it in a book called Pharmacopoeias. Traditional plant-based remedies are still trusted in our cultures and nations today. Furthermore, plant-based therapies are becoming more and more common in modern medicine. At the

moment, scientists are focusing their attention on researching and finding new compounds derived from plants that can successfully control diseases that currently exist.

Integrating Ancient Wisdom with Modern Veterinary Medicine

Traditional veterinary medicine has been known to humans since prehistoric times (Gao et al., 2024). The days of dismissing ethnoveterinary medicine and all other forms of ethnic knowledge as superstition, witchcraft, or myth are long gone. There is no denying the importance of ethnoveterinary medicine in the evolution of livestock (Solazzo et al., 2024). The practice of ethnoveterinary medicine has frequently trailed behind that of modern veterinary care, in part because it was carried out covertly and the data was concealed in the gray literature. Currently a sizable body of published material, including an annotated bibliography that abstracts over 1200 papers (Paul et al., 2024). Over time, ethnoveterinary knowledge (EVK) has gained recognition on a global scale. This knowledge is kept in the same way as it is passed down through practice, in the form of artifacts passed down from mother to daughter or father to son, or it is haphazardly documented in book (Rogers-Stokes et al., 2024). According to Wynn (2001), conventional medicine as it exists today is unquestionably the earliest kind of medicine and most likely developed at the same time as human evolution (Vaneechoutte et al., 2024). Records from the past show that animal treatment dates back more than 14,000 years. As animals were being domesticated, veterinary medicine developed expressly to address their health. Over the years, simple traditional remedies have gradually changed in almost every nation on Earth (Van der Vliet, 2024). While veterinary medicine is an ancient field, its recognition and subsequent appreciation in scientific and academic circles is relatively recent. Its significance was only brought to light in the mid-1970s and began to gain traction in the early 1980s. This time frame can be fairly and rightly considered a revolution in the field of ethnoveterinary medicine today (Padalino et al., 2024). Some of these essential traditional health practices were abandoned without thought when modern medicine arrived and ethnocentric interactions persisted (Inman, 2024). It wasn't until the turn of the 20th century that it became apparent that some essential traditional health information had been forgotten and needed to be recovered. However, the realization did not receive the serious attention it deserved until the Western world's researchers, scholars, planners, and developers came to terms with the fact that ethnoveterinary medicine is just as important as orthodox medicine and that the two can work in tandem to create a sustainable system for the delivery of livestock health care toward the end of the 20th and the beginning of the 21st centuries. To ignore ethnoveterinary medicine in the current evolution would be a greater loss of human history (Shekhawat and Baher 2024).

Conclusion

In the end, nations themselves must take action if rinderpest is to remain free to spread around the globe. Due to deficiencies in national veterinary services in many regions of the world, certain nations would be more equipped than others to deal with a rinderpest outbreak. Since rinderpest is still a risk, it will be crucial that veterinary education and training programs, especially for government veterinarians, keep veterinary professionals aware of the disease's clinical and pathological manifestations and that OIE Reference Laboratories can conduct diagnostic tests on suspected cases. Additionally, nations and foreign donors must keep up their investments in bolstering national veterinary services' capacity to combat any dangers to animal health. Support for the framework's implementation will be required to preserve global freedom. It will be crucial to persuade donors of the mid-to-long-term necessity for such investment because rinderpest post-eradication efforts are funded by extramural funds given by donors, as they fall outside the purview of the OIE and FAO's primary mandates. It is challenging to envision an endpoint in 2016, given that official reports to the OIE state that RVCM is stored in 22 facilities across 21 countries worldwide, and that five facilities in four countries have been approved as rinderpest holding facilities (with several other countries considering putting their institutes forward for approval). Will the world community consent to destroying any rinderpest material and virus stocks left? Will the virus be kept in a minimum number of facilities that have been approved? And what figure is that going to be? How will the risks associated with synthetic biology be reduced, even if destruction is accomplished? In the upcoming years, the international community will need to give these questions careful thought. In the twenty-first century, a "one health" approach to illness is being emphasized a lot; the rinderpest eradication procedure was possibly the first coordinated effort that might be considered a success story of this strategy. The fields of veterinary medicine and wildlife ecology both made contributions, which were combined with socio-ecological methods of diagnosing illnesses and providing care.

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