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Review Article

Ethnoveterinary Practices for Wild Medicinal Plants from Malawi, Rwanda, and Ethiopia: A Critical Review

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Abstract: Ethnoveterinary practices, particularly the use of wild medicinal plants, play a significant role in animal healthcare in many rural communities of Malawi, Rwanda, and Ethiopia. These traditional practices provide affordable and culturally relevant alternatives to conventional veterinary medicine, especially where access to modern animal healthcare is limited. However, despite their potential, limited documentation and systematic evaluation of these practices pose challenges for their integration into broader animal health strategies and conservation efforts. This critical review aims to synthesize available knowledge on wild medicinal plants used in ethnoveterinary medicine across the three countries, focusing on plant species, preparation methods, dosage, and efficacy. The methodology involved a comprehensive literature search of peer-reviewed articles using databases such as PubMed, Scopus, and Web of Science. Inclusion criteria were applied to identify studies documenting traditional uses, plant preparation, dosage, and efficacy. Data extraction focused on key plant species, ethnoveterinary applications, preparation techniques, and reported effectiveness. Findings reveal a diverse range of wild plants utilized for treating various animal health issues, such as gastrointestinal disorders, wounds, and parasitic infections. Preparation methods often include decoctions, infusions, and topical applications. While many plants are reputed to have high efficacy, scientific validation remains limited for many species. The review underscores the need for further pharmacological studies and policy measures to protect traditional knowledge and biodiversity. This study highlights the critical role of ethnoveterinary practices in enhancing animal health and emphasizes the need to integrate traditional and modern approaches, promoting conservation and sustainable utilization of wild medicinal plant resources.

Keywords: Critical review, Ethnoveterinary medicine, Malawi, Rwanda, Ethiopia, Traditional knowledge, Wild medicinal plants.

INTRODUCTION

Ethnoveterinary medicine encompasses the traditional knowledge, practices, and beliefs indigenous communities use to care for and manage their animals. This holistic approach relies on culturally rooted and locally available resources, particularly medicinal plants, to prevent and treat a variety of animal diseases [1]. Across Africa, ethnoveterinary practices have been vital in addressing animal health challenges, especially in rural and pastoral regions where access to modern veterinary services is limited or prohibitively expensive. The knowledge of these practices often passed down through generations, reflects a deep understanding of local flora, animal health dynamics, and the socio-cultural importance of livestock within these communities [2, 3].

The significance of ethnoveterinary medicine in African animal healthcare cannot be overstated. Livestock play a central role in the economic, nutritional, and social well-being of millions of people across the continent, serving as a source of food, income, and cultural identity [4]. Effective livestock health management directly impacts food security, livelihoods, and resilience to economic shocks. Traditional remedies using wild medicinal plants thus represent an indispensable resource for maintaining animal health, especially when commercial veterinary drugs are scarce or unaffordable [5]. Furthermore, these practices can offer environmentally sustainable alternatives to synthetic drugs, reducing the risk of drug resistance and fostering biodiversity conservation [6].

This critical review focuses on ethnoveterinary practices involving wild medicinal plants in three African countries: Malawi (Table 3), Rwanda (Table 2), and Ethiopia (Table 1). It aims to comprehensively assess the types of medicinal plants used, their therapeutic applications, and their roles in local animal healthcare systems. By exploring existing ethnobotanical surveys, historical accounts, and recent studies, this review seeks to evaluate the efficacy, safety, and potential for integration of these traditional remedies into contemporary veterinary medicine. The goal is to illuminate the value of traditional knowledge while identifying challenges related to preservation, standardization, and potential commercialization. Ultimately, by analyzing the intersection of ethnoveterinary knowledge and modern science, this review contributes to enhancing sustainable animal healthcare solutions that benefit both livestock and their human caretakers in these countries.

Table 1: Ethiopia

Medicinal Plant	Traditional Use	Preparation Method
Aloe vera	Wound healing	Fresh leaf gel applied directly
Vernonia amygdalina	Anti-parasitic	Leaf decoction
Azadirachta indica	Skin diseases	Leaf paste/oil
Croton macrostachyus	Bloat treatment	Bark decoction

Table 2: Rwanda

Medicinal Plant	Traditional Use	Preparation Method
Tetradenia riparia	Respiratory issues	Leaf infusion
Tithonia diversifolia	Digestive problems	Fresh leaves
Prunus africana	General health	Bark extract

Table 3: Malawi

Medicinal Plant	Traditional Use	Preparation Method
Moringa oleifera	Nutrition supplement	Leaf powder/extract
Warburgia salutaris	Anthelmintic	Bark decoction
Eucalyptus species	Respiratory relief	Leaf inhalation

METHODOLOGY

Methodology: Ethnoveterinary Practices for Wild Medicinal Plants from Malawi, Rwanda, and Ethiopia - A Critical Review

1. Literature Search Strategy

Databases Used:

- PubMed
- Scopus
- Web of Science

Search Terms

The search focussed on keywords and combinations of terms such as “ethnoveterinary practices,” “wild medicinal plants,” “Malawi,” “Rwanda,” “Ethiopia,” “traditional veterinary medicine,” “herbal remedies,” and “animal health.”

Search Parameters

- Timeframe: Studies published in the last 20 years (or as relevant to topic breadth)
- Language: English
- Study Focus: Wild medicinal plants used in ethnoveterinary practices within the specified countries.

2. Inclusion and Exclusion Criteria

Inclusion Criteria

- Peer-reviewed articles and books focused on ethnoveterinary practices using wild medicinal plants in Malawi, Rwanda, and Ethiopia.
- Studies documenting the use of wild medicinal plants for treating livestock or other animals.
- Articles that detail the preparation methods, administration, and dosage of wild plant-based treatments.
- Research that evaluates or provides information on the efficacy of plant-based remedies used in ethnoveterinary settings.

Exclusion Criteria

- Studies that focus solely on cultivated or domesticated medicinal plants.
- Research not focused on ethnoveterinary use (e.g., human medicine without animal applications).
- Non-peer-reviewed articles, opinion pieces, and publications without clear data or methodology.

3. Data Extraction and Analysis

Data Extraction Process

Relevant information from selected studies was extracted systematically using a data extraction form. Key information to be collected includes:

a. Plant Species Information:

- Scientific and local names
- Geographic distribution and habitat
- Conservation status (if available)

b. Ethnoveterinary Use:

- Traditional uses for specific animal health conditions
- Target animal species (e.g., cattle, goats, poultry)

c. Preparation Methods:

- Detailed preparation techniques (e.g., decoctions, infusions, poultices)
- Any accompanying materials or substances used in combination

d. Dosage and Administration:

- Specific dosage recommendations, if provided (e.g., quantity, frequency of use)
- Mode of administration (oral, topical, etc.)

e. Efficacy and Validation:

- Reported efficacy based on traditional knowledge or scientific studies
- Any available pharmacological validation of plant efficacy

Data Synthesis and Critical Analysis

- Comparative Analysis: Identify patterns and differences in the use of wild medicinal plants across Malawi, Rwanda, and Ethiopia, with attention to species overlap, regional practices, and common ailments treated.
- Assessment of Efficacy and Safety: Critically review data on efficacy and any reported toxicological concerns or adverse effects related to plant use in ethnoveterinary practices.
- Cultural and Socioeconomic Context: Evaluate how cultural beliefs, access to veterinary care, and socioeconomic factors influence the use of wild medicinal plants in these regions.

Reporting

The review was present synthesized data with appropriate tables and figures where applicable, providing clear comparisons and insights. Recommendations for future research or conservation strategies for key medicinal species. This methodology aims to systematically reviewed and analyzed the use of wild medicinal plants for ethnoveterinary purposes across three East African countries, highlighting their significance and potential applications while considering traditional knowledge and scientific validation.

RESULTS

Overview of Plant Species Used in Each Country

Ethnoveterinary practices in Malawi, Rwanda, and Ethiopia rely on a diverse range of wild medicinal plants, each selected based on indigenous knowledge, local ecology, and animal health needs [7]. In Malawi, *Aloe vera* is commonly

used for its anti-inflammatory and wound-healing properties, applied topically on wounds and skin infections. *Khaya anthotheca* (African mahogany) is utilized to manage parasitic infestations, particularly in cattle, through decoctions made from its bark. Additionally, *Azadirachta indica* (neem) is employed for its insecticidal and antimicrobial qualities, often used to treat external parasites like ticks.

In Rwanda, *Vernonia amygdalina*, also known as bitter leaf, is a popular choice for gastrointestinal issues and malaria-like symptoms in animals due to its strong antiparasitic properties [8]. *Prunus africana* (African cherry) is used to treat inflammatory conditions and urinary tract disorders, while *Erythrina abyssinica* is known for addressing respiratory ailments and fever in livestock. The extensive use of these plants highlights Rwanda's reliance on easily accessible species with known medicinal effects.

Ethiopia's ethnoveterinary tradition includes a broad range of medicinal plants tailored to specific ailments [9]. *Allium sativum* (garlic) is widely used for its antimicrobial and antifungal properties, commonly administered orally to treat bacterial infections in cattle. *Croton macrostachyus* (broad-leaved croton) is another critical plant used for controlling internal parasites, while *Hagenia abyssinica* (African redwood) is utilized for treating tapeworm infestations in sheep and goats through the preparation of powders and decoctions.

Comparison of Preparation Methods and Dosage

Preparation methods for ethnoveterinary remedies vary across Malawi, Rwanda, and Ethiopia, often reflecting each culture's traditions and practices. In Malawi, plant parts like leaves, roots, or bark are typically pounded into a fine paste or boiled to make decoctions and infusions. For example, *Khaya anthotheca* bark is boiled and administered orally to livestock suffering from parasitic infections, while Aloe vera leaves are crushed to extract a gel that is directly applied to wounds. Dosages are estimated based on animal size, age, and severity of the condition, often determined by the healer's experience rather than standardized protocols [8].

In Rwanda, maceration and soaking methods are widely used. *Vernonia amygdalina* leaves are crushed and soaked in water to create a solution administered orally to combat internal parasites in cattle. The preparation and dosage vary depending on the desired strength and animal size, with remedies typically tailored by community healers. Tinctures, pastes, and mixtures for external and internal use are common, with dosage adjustments made through experiential knowledge passed down through generations.

Ethiopian practices often rely on infusions, smoke baths, and powders. Allium sativum cloves are crushed and mixed with water or other herbs for oral administration, targeting bacterial infections in livestock. *Hagenia abyssinica* flowers are ground into powder and mixed with feed to treat tapeworm infestations. While precise dosages are determined by traditional knowledge, there is often considerable variation, raising concerns about the consistency and reproducibility of these treatments [10]. Efforts to systematize dosages are complicated by the variability of plant potency and preparation methods.

Efficacy of Plants in Treating Animal Ailments

The efficacy of wild medicinal plants used in ethnoveterinary practices varies but is widely supported by anecdotal evidence and practical success in rural communities. In Malawi, *Aloe vera* is highly regarded for promoting rapid wound healing and reducing inflammation, with livestock owners often reporting visible improvements in animal health. Similarly, decoctions of *Khaya anthotheca* are noted for reducing parasite loads, though efficacy depends on proper preparation and dosage [11].

In Rwanda, *Vernonia amygdalina* has proven effective against gastrointestinal parasites, helping maintain livestock health and productivity. Its antiparasitic properties are attributed to bioactive compounds like alkaloids and saponins [12]. *Prunus africana* is another example, known for treating inflammation and promoting urinary tract health in cattle. Community observations and case studies suggest high effectiveness, though clinical validation remains limited.

Ethiopia's ethnoveterinary practices, including the use of *Allium sativum*, demonstrate notable success in managing bacterial and fungal infections. *Hagenia abyssinica* treatments for tapeworm infestations have been reported as highly effective, leading to reduced worm burden in treated animals [13]. Despite promising outcomes, scientific validation is crucial to confirm efficacy, ensure safe dosages, and explore potential integration with conventional veterinary medicine. Controlled trials and research partnerships can help bridge traditional practices and modern scientific approaches, maximizing the benefits of ethnoveterinary knowledge in animal healthcare systems across Africa.

DISCUSSION

Regional Similarities and Differences in Ethnoveterinary Practices

Ethnoveterinary practices in Malawi, Rwanda, and Ethiopia reflect a shared reliance on medicinal plants as a primary means of animal healthcare. This reliance stems from limited access to modern veterinary services, high costs of pharmaceuticals, and cultural traditions deeply rooted in the local use of natural resources [14]. Across these regions, plants are used to treat common ailments such as parasites, wounds, respiratory infections, and gastrointestinal disorders, underscoring a universal reliance on indigenous knowledge. Despite these similarities, significant differences in plant species selection and preparation methods highlight the unique biodiversity and cultural adaptations within each country. For example, Malawi emphasizes the use of *Aloe vera* and *Khaya anthotheca*, often prepared through pounding and boiling, reflecting the availability of these species and their proven effectiveness in local treatments [15]. In Rwanda, the prevalence of *Vernonia amygdalina* for addressing gastrointestinal disorders and *Prunus africana* for inflammation reflects a focus on specific ailments with traditional significance. Preparation often involves maceration and soaking, yielding remedies customized to local livestock needs. Ethiopia's use of *Allium sativum* for antimicrobial purposes and *Hagenia abyssinica* for internal parasites showcases a distinct approach, with infusions, powders, and smoke baths playing a central role. These differences demonstrate the influence of ecological diversity, livestock management practices, and cultural heritage on the evolution of ethnoveterinary medicine in each region [16].

The table below summarizes key wild medicinal plant species used in ethnoveterinary practices in Malawi, Rwanda, and Ethiopia, including their abundance and primary uses in animal healthcare.

Table 4: Ethnoveterinary Practices for Wild Medicinal Plants from Malawi, Rwanda, and Ethiopia

Country	Plant Species	Abundance	Primary Uses in Ethnoveterinary Medicine
Malawi	*Aloe vera*	Common in rural areas	Used for wound healing, reducing inflammation, and treating skin infections
Malawi	*Khaya anthotheca*	Moderate, at risk	Treatment for parasitic infestations in cattle (e.g., decoctions from bark)
Malawi	*Azadirachta indica (Neem)*	Common in some regions	Used as an insecticide and antimicrobial agent for external parasites
Rwanda	*Vernonia amygdalina*	Relatively common	Treats gastrointestinal disorders, malaria-like symptoms, and parasites
Rwanda	*Prunus africana*	Vulnerable, overharvested	Used for anti-inflammatory purposes and urinary tract disorders
Rwanda	*Erythrina abyssinica*	Moderate	Treats respiratory ailments and fever in livestock
Ethiopia	*Allium sativum (Garlic)*	Widespread	Used for antimicrobial and antifungal properties, typically administered orally
Ethiopia	*Croton macrostachyus*	Moderate	Controls internal parasites in livestock
Ethiopia	*Hagenia abyssinica*	Scarce in some areas	Treatment for tapeworm infestations, typically prepared as powders

Potential Benefits and Limitations of Traditional Medicine

The use of wild medicinal plants in ethnoveterinary practices offers substantial benefits, particularly for communities in rural and underserved areas [3]. Traditional remedies are cost-effective, locally available, and deeply embedded in cultural practices, providing accessible solutions for livestock health [17]. The reliance on natural plant-based treatments can reduce dependence on synthetic drugs, mitigating risks such as antimicrobial resistance and contributing to biodiversity preservation. Moreover, ethnoveterinary knowledge strengthens cultural identity and promotes the intergenerational transfer of traditional wisdom, enhancing community resilience and self-reliance [16]. However, these practices also have limitations. The absence of standardized dosages and preparation methods can lead to variable efficacy and potential toxicity risks. Traditional remedies often rely on experiential knowledge without scientific validation, raising concerns about consistency and safety. Additionally, integrating traditional medicine into formal veterinary practices requires addressing knowledge gaps and developing evidence-based protocols to ensure safe and effective use. Despite these challenges, combining traditional and modern approaches holds promise for enhancing animal healthcare across Malawi, Rwanda, and Ethiopia.

Conservation Concerns for Wild Medicinal Plants

The growing demand for wild medicinal plants used in ethnoveterinary medicine presents pressing conservation challenges [18]. Overharvesting, habitat destruction, and climate change threaten the availability of key plant species across Malawi, Rwanda, and Ethiopia. Plants such as *Khaya anthotheca* and *Prunus africana*, which are highly sought after for their therapeutic properties, face particular risk due to unsustainable harvesting practices. The loss of these plants would

not only diminish the efficacy of ethnoveterinary practices but also impact biodiversity and ecosystem health [17]. Effective conservation strategies are essential to safeguard these resources for future generations. Community-based management initiatives, cultivation programs, and the establishment of protected areas can help ensure the sustainable harvesting and regeneration of wild medicinal plants [4]. Moreover, raising awareness among local communities about the importance of conservation and promoting practices that balance use with preservation are key to maintaining the health of both livestock and ecosystems [2]. Collaborative efforts between traditional healers, researchers, policymakers, and conservationists are crucial for developing and implementing sustainable management practices that protect these valuable plant resources while supporting the needs of local communities.

CONCLUSION

Ethnoveterinary practices utilizing wild medicinal plants in Malawi, Rwanda, and Ethiopia are vital for rural animal healthcare, providing accessible and culturally relevant remedies. This review highlights a diverse range of plant species used to treat various animal ailments with traditional knowledge passed down generations. However, the lack of comprehensive scientific validation and documentation remains a barrier to their integration into formal veterinary practices. It is recommended that further pharmacological research be conducted to validate the efficacy and safety of these plants. Efforts should also focus on preserving traditional knowledge through community-based programs and integrating ethnoveterinary practices with modern veterinary services to enhance animal health and biodiversity conservation.

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