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Use of ethnoveterinary medicines for poultry health management in Southern Africa Development Community (SADC) countries: A review

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Abstract

Poultry emerges as the most efficient livestock sub-sector in its use of natural resources and providing protein to supply a global growing demand. Farmers have indigenous methods to treat diseases using medicinal plants through indigenous knowledge systems. The application of indigenous knowledge to treat animal diseases is known as ethnoveterinary medicine. This review aims to document medicinal plants that are used for treating poultry diseases in SADC countries and acts as a baseline for future research in chemical analysis, drug development and conservation studies. Small scale poultry farmers in SADC countries face many challenges in the improvement of the poultry sector which include health management, lack of knowledge and extension services, poor marketing strategies, expensive vaccines and conventional drugs among others. However, there are opportunities to boosting the poultry sector in the region if only some government policies

can be reviewed to support the poultry industry. SADC has a vast indigenous knowledge of plants that are effective in managing poultry health. Detailed research is needed to standardize the safety, efficacy, frequency of treatment, concentrations and dosage forms of such remedies.

Key words

Ethnoveterinary, poultry, SADC, indigenous knowledge, conventional drugs

Introduction

The Southern African Development Community's (SADC) smallholder farming systems mostly rely on livestock and the goods they produce as the primary source of income. According to Otte and Knips, (2005), households make ends meet through the sale of livestock products including milk, eggs, and meat. Poultry products, mostly meat and eggs are among the most common animal protein source consumed at the global level, through a wide diversity of cultures, traditions and religions, and as such they are key to food security and nutrition (Mottet & Tempio, 2017). Poultry emerges as the most efficient livestock sub-sector in its use of natural resources and providing protein to supply a global growing demand. Poultry is particularly important for smallholder farmers and poor rural and urban communities and is mainly produced in large scale and intensive operations, making it one of the fastest growing agricultural sub-sectors (Mottet & Tempio, 2017).

Village chickens in Southern Africa are raised mostly under a scavenging system and, to a lesser extent, semi-intensive systems with minimal inputs for housing, food, and medical care (Simbizi *et al*., 2021). Poultry in rural areas are mostly owned and managed by women and children and are often essential elements of female-headed households (Mtileni *et al*., 2009). Farmers have indigenous methods to treat diseases using medicinal plants through indigenous knowledge systems. The application of indigenous knowledge to treat animal diseases is known as ethnoveterinary medicine (EVM). EVM can be defined as an indigenous animal healthcare system that includes the traditional beliefs, knowledge, skills, methods and practices of a given society (Suroowan *et al*., 2017).

In many developing countries, farmers mix the use of indigenous ethnoveterinary knowledge and synthetic veterinary health care systems to treat poultry (Ndlovu et al., 2023). Conventional drugs are however often unavailable due to reasons that either agricultural extension and veterinary services are limited or understaffed or because synthetic drugs are way too expensive for their

affordability (Kebede *et al*., 2017). Ethnoveterinary medicine therefore plays an important role in the animal health care system in many SADC countries. EVM are perceived as simple, cost-effective and environmentally friendly. Due to its manner of transmission, indigenous veterinary knowledge has been and continues to be oral, and the likelihood of losing accumulated medical heritage is high (Gabalebatse et al., 2013). Research on the ethnoveterinary use of medicinal plants to cure livestock illnesses, especially in poultry, is limited in Southern Africa, which further undermines the usefulness of this practice (Moreki et al., 2010). For the benefit of future generations, the SADC's ethnoveterinary traditions and medicinal plant resources urgently need to be documented, preserved, and protected (Marandure, 2016). This review aims to document medicinal plants that are used for treating poultry diseases in SADC countries and acts as a baseline for future research in chemical analysis, drug development and conservation studies.

Constraints to poultry production in SADC countries

Infectious diseases constitute a major challenge to the growth and profitability of the rural poultry sector in Sub-Saharan Africa (Simbizi *et al*., 2021). The productivity of chickens is however hampered by several factors, including a wide range of infectious diseases such as Newcastle diseases, avian influenza, infectious bursal disease (IBD), fowl cholera and avian infectious bronchitis (Simbizi *et al*., 2022). Furthermore, village hens may be a possible source of these infections, endangering the growth of the region's semi-commercial poultry industry. When commercial farm wasted chickens are brought into rural areas, the opposite also occurs.

One of the most frequently cited constraints to improved performance in the poultry sector found in literature on Sub-Saharan Africa is the lack of stable, reliable sources of feed. An inconsistent availability of raw materials, poor and uneven distribution of commercial feed, and high prices for feed were severe constraints to increased poultry production in Sub-Saharan Africa. In some of the SADC countries, the raw materials are available to produce feed locally, however, seasonal fluctuations in supply and price are cited by growers as a primary concern. Disruptions in feed supplies have severe economic consequences for growers throughout Sub-Saharan Africa (Ncube *et al*., 2016).

Other inputs in poultry rearing are also major constraints to improved productivity and performance, including vaccinations and chick supplies. A lack of vaccinations and veterinary care have led to a great deal of morbidity and mortality in the SADC region. In some remote areas in

the region growers are not knowledgeable on the use of vaccinations while in other areas these inputs are not readily available or can be generally very expensive for the resource-poor farmer. In some cases, veterinary care and medicines are supplied by the private sector, while in other countries these services remain the responsibility of the government (Farrelly, 1996).

Lack of technical training and extension services has limited the ability of most small-scale rural farmers to increase productivity (Farrelly, 1996). Most veterinary and extension workers in developing countries have lack of interest and motivation to become involved in assisting these farmers. Poor management in poultry farmers in the rural areas is often a result of scarce technical services, which subsequently leads to low levels of technical efficiency and increased mortality (Mapiye *et al*., 2008). Limited availability of credit to poultry farmers is a key constraint to increased investment in the sector. Coordination and marketing are also potential problems for improved productivity in the sector. Most of the poultry products in Sub-Saharan Africa are marketed in spot markets. The risk assumed by growers who market their own products in the spot market is great due to the perishability of the product and the lack of cold storage.

A final potential constraint to improved performance is the effect of government policies on the sector. Import and export policies have had a particularly significant effect on the poultry sector. In many countries, exportation of poultry products is banned, limiting the potential for expanding markets (Farrelly, 1996). High import taxes on essential inputs such as vaccines and medicines, equipment, and breeding stock have created a disincentive for investment.

Ethnoveterinary plants used to manage poultry health in SADC countries

Aloe species were shown to be a common ethnoveterinary plant used in all SADC countries that had literature reviewed. Other common plants across the SADC countries with published literature included *Capsicum spp, Moringa spp, Terminalia spp, Allium spp, Nicotiana spp, Cissus spp, Senna spp* and *Colophospermum mopane*. The cultural background of users may have an impact on traditional uses of plants. Geographical proximity between various cultures creates opportunity for information exchange regarding plant resources utilized as ethnoveterinary remedies (Gobvu et al., 2023). Cross-cultural and geographic connections have facilitated the exchange of information. The use of medicinal plants and their understanding are deeply rooted in institutions of higher learning and culture. A variety of factors are included in local knowledge, such as

language, religion, social networks, cultural beliefs, human cognition, and information availability (Haq et al., 2023).

Table 1. Medicinal plants used for managing poultry health in SADC countries

SADC country	**Reference**	**Plant(s) used**
Botswana	Gabanakgosi *et al*., 2012	*Aloe spp.*
		Moringa oleifera
		Nicotiana tobacum
		Bascia albitruna
		Senna italic
		Capsicum annum
	Moreki, 2012	*Dicoma spp.*
		Garcinia livingstonei
		Senna italica
		Aloe spp.
		Harphagohytum procumbens
		Boscia albitrunca
		Croton gratissimus
		Sclerocy abirrea
		Colphospermum mopane
		Terminalia sericea
		Urginia sanguinea
		Cassia abbreviata
		Senecio strictifolius
		Elephantorrhiza elephantina
		Oxygonum alatum
		Nicotiana tobacum
		Allium sativum
		Allium cepa
	Gabalebatse *et al*., 2013	*Ziziphus mucronata*

		Terminalia sericea
		Senna italica
		Euphorbia inaquilatera
Namibia	Chinsembu *et al*., 2014	*Aloe esculenta*
		Aloe zebrina
		Ziziphus mucronata
		Combretum imberbe
	Eiki *et al*., 2022	*Aloe esculenta*
		Aloe littoralis
		Combretum imberbe
		Colophorspermum mopane
		Ziziphus mucronata
		Ximenia americana
South Africa	Luseba & Tshisikhawe, 2006	*Aloe marlothii*
		Terminalia sericea
		Garcinia livingstonei
		Pterocarpus angolensis
		Dicerocaryumerio carpium
	Simbizi *et al*., 2021	*Aloe spp.*
	McGaw & Eloff, 2008	*Sclerocarry abirrea*
		Aloe ferox
		Aloe greathedii
		Leonottis leonurus
		Dombeya rotundifolia
		Aloe marlothii
		Aloe zebrine
		Terminalia sericea
		Solanum incacum
		Cassia abbreviata
		Ximenia americana

	Luseba & Van der Merwe, 2006.	*Sarcostemma viminale*
		Aloe marlothii
		Aloe zebrine
		Terminalia sericea
		Cissus quadrangularis
		Balanites maughamaii
		Jatropha zeyheri
		Cassia abbreviata
		Pterocarpus angolensis
		Solanum lichtensteini
		Senna italica
		Dombeya rotundifolia
	McGaw *et al*., 2020	*Terminalia sericea*
		Aloe ferox
		Aloe zebrine
	Ndlovu *et al*., 2023	*Aloe spp*
		Carica papaya
		Capsicum frutescens
		Moringa spp.
		Albizia adianthifolia
		Lannea stullmanni
		Citrus limon
		Optunia vulgaris
		Zingiber officinale
		Cucurma spp.
		Allium cepa
		Allium sativum
Tanzania	Tomeka *et al*., 2020	*Aloe vera*
		Aloe volkensii
		Agave sisalana

		Tetradenia riparia
		Capsicum frutescens
		Bidens pilosa
		Kigelia africana
		Terminalia sericea
		Azadirachta indica
		Nicotiana tobacum
		Erythria abyssinica
		Leucaena leucocephala
		Senna siamea
		Moringa oliefera
		Cissus quadrangularis
Zimbabwe	Masimba *et al*., 2011	*Aloe vera*
		Erythrina abysinnia
		Ficus exasperate
		Euphorbia matabelensis
		Sarcostemma viminale
		Parinari curatefolia
		Lycopersicon esculentum
		Cissus vitacea
		Capsicum annum
		Allium sativum
		Albizia gummifera
	Mwale *et al*., 2005	*Aloe vera*
		Aloe spicata
		Lycopersicon esculentum
		Myrothamnus flabefollius
		Lannea stullmanni
		Ficus burkei
		Sarcostemma viminale

		Capsicum annum
		Parinaria curatefollia
		Albizia gummifera
	Jambwa *et al*., 2021	*Agave sisalana*
		Chenopodium ambrosoides
		Crinum macowanni
		Catharanthus roseus
		Sarcostemma viminale
		Aloe chabaudii
		Aloe greathedii
		Aspilia pluriseta
		Bidens Pilosa
		Vernonia adensis
		Ximenia caffra
		Moringa oleifera
		Musa sapientum
		Adenia gummifera
		Passiflora edulis
		Capsicum fruitescens
		Datura stramonium
		Lippia javanica
		Euphorbia triucalli
		Bobgunnia madagascariensis
		Cassia abbreviata
		Dalbergia nitidula
		Erythria abyssinica
		Pterocarpus angolensis
		Senna singuena
		Xeroderris stuhlmanni
		Strychnos cocculoides

		Khaya anthotheca
		Morus alba
		Ximenia americana
		Tridactyle bicaudala
		Vanguena infausta
		Citrus limon
		Solanum incanum
		Solanum lycopersicum
	Gumbochuma *et al*., 2013	*Aloe spp*
		Capsicum annum
		Lannea stullmanni
		Albizia adianthifolia

Opportunities and constraints in the use of ethnoveterinary medicines

Traditional medicines offered by EVM are accessible locally and typically cost less than conventional therapies. Homemade medicines can be prepared and used by traditional practitioners without incurring any costs. The plants used to make ethnoveterinary medications are often inexpensive, easily obtainable, and have few negative effects. EVM are a crucial part of the agricultural and environmental sectors and have the ability to significantly impact the region's macroeconomic growth as well as the eradication of rural poverty. Therefore, EVM offers several benefits, like being a source of contemporary medicine, being inexpensive, easily accessible and available locally, being culturally suitable and understood, being effective, quickly metabolizing plants and plant extracts, and being user-friendly (Marandure, 2016; Jambwa et al., 2021; Temeche & Asnakew, 2020).

One of the main disadvantages of the use of herbal plants is the lack of scientific evidence on their efficacy and the lack of precise dosages, which could lead to toxicity (Marandure, 2016). Indigenous ethnoveterinary practices were carried out essentially based on private practice. The information reserved by traditional healers due to high secrecy is relatively less susceptible to distortion but ends up being less accessible to the public (Mwale *et al.*, 2005). The fact that some herbs are available only in certain seasons often limits the use of herbal plants. Moreover, some of

the preparations are mixtures of many kinds of plants which may be difficult to find at the same time.

The preparation and use of ethnoveterinary medicines is often difficult and has inconveniences (Mudzengi *et al.*, 2014). Some herbal plants have special preparation methods. The resource base for preparation methods is deteriorating, making ingredients unavailable for preparing medicines. It is not easy to standardize herbal therapies as the concentration of active ingredients varies in different parts of the plants (Temeche & Asnakew, 2020). Cases of toxicity and underdosing are more as there is no exact dosage in relation to body weight. That some herbs are available only in certain seasons often limits the application of ethnoveterinary medicines. In the absence of regulatory control, product quality becomes variable. Owing to these benefits and constraints of EVM use, there is need to enhance and develop their beneficial aspects and address constraints that are faced in using them.

Conclusions

The increase in poultry production in the SADC region gives a rise in the need for ways to increase productivity by doing away with health-related challenges. Due to available evidence of the affordability and effectiveness of herbal plants there is need to investigate and opt for their increased use especially for the plants that are mostly used across the region. Oral transmission of traditional knowledge on herbal plants give rise to the possibility of incompleteness, omission, misrepresentation or distortion of the original herbal plants as time goes on, therefore, it presents an urgent need for being recorded and documented for future utilization. Little has been done to enhance and develop the beneficial aspects of herbal plants, so, detailed research is needed to standardize the safety, efficacy, frequency of treatment, doses, concentrations and dosage forms of such remedies.

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