Chapter

Use of Indigenous Knowledge Systems for Managing Cattle Health in Zimbabwe: Challenges and Opportunities

Vimbai Gobvu, Kudakwashe C. Chirigo, Takudzwa L. Charakupa and Clarice P. Mudzengi

Abstract

Cattle play a pivotal role especially for the rural farmer by providing milk, draught power, meat and serving as an indication of wealth among other roles. Research and development of cattle production especially in communal areas can be a sustainable way to improve the livelihoods of the rural population. Major constraints to communal cattle production include high prevalence of diseases, limited forage and poor marketing linkages. For reasons that include; lack of veterinary clinics and extension services, high costs of drugs and potency of the ethnoveterinary medicines, many farmers have resorted to the use of their indigenous knowledge systems (IKS) in the management of cattle diseases. Generally, these practices are cheap, locally available, and sustainable especially in times of climate change and variability. One of the challenges in the use of (IKS) is the lack of scientific evidence on their efficacy and the lack of precise dosages, which could lead to toxicity. There is need therefore for documentation, research and scientific validation of IKS to increase their sustainable use and adoption in livestock health management.

Keywords: ethnoveterinary medicine, livestock, conventional, research, scientific validation

1. Introduction

Livestock production is important in the livelihoods of people living in developing countries like Zimbabwe. It has an important role in food security and nutrition, and the general economy [1, 2]. For instance, cattle provide food, manure for crop production and soil fertility management, raw material for industry, cash income as well as in promoting saving, fuel, social functions, and employment [3]. Cattle are an important livestock species in Zimbabwe, as they contribute about 25% to gross domestic product (GDP). Generally, cattle rearing is significant to the socio-economic profile of rural households [4].

Cattle production is hindered by several challenges in the rural areas which include nutrition-related problems, market linkages problems, lack of technical know-how and cattle health related problems. High costs of veterinary medicines, dilapidated government veterinary services that have since been incapacitated to supply veterinary drugs, poor road, and other communication networks affect information dissemination, hence the availability of conventional drugs to treat livestock diseases in most rural areas [5]. With farmers being aware of the need to keep their cattle in a state of well being they then resort to the use of indigenous knowledge systems (IKS) through the use of ethnoveterinary medicines to treat their livestock.

Indigenous knowledge systems are an adhesive that binds society, being durable local knowledge [6], hence the cornerstone for building of our identity and ensuring coherence of social structures within communities [7]. Mapara [8] mentions that IKS have traditionally been passed from generation to generation orally; hence people possess little or no knowledge of invaluable practices such as ethnoveterinary medicine which depend only on historical evidence of use as proof of safety and effectiveness [5]. Ethnoveterinary medicine (EVM) is the study of people's folk beliefs, knowledge, skills, methods, and practices on the healthcare of animals, including the use of medicinal plants, surgery techniques, and management practices for the prevention and treatment of livestock diseases [9]. Generally, ethnoveterinary practices are cheap, locally available, and sustainable especially in times of climate change and variability [5]. EVM have controlled a wide spectrum of common livestock diseases successfully, including diarrhoea, wounds, coccidiosis and reproductive disorders [10–12]. This review focuses on the use of IKS in managing cattle diseases in Zimbabwe including the methods of preparing and administering the remedies. The review will serve as a baseline for the use of these IKS remedies for potential veterinary drugs development.

2. Cattle production trends post Land Reform Programme in Zimbabwe

Figure 1 highlights trends in cattle numbers from 2001 to 2021. As depicted in **Figure 1**, from 2001 to 2008, cattle production in Zimbabwe has been massively underperforming as the total national herd declined from between 6,270,000 to 5,012,000. The decline in cattle production was evidenced by various challenges such

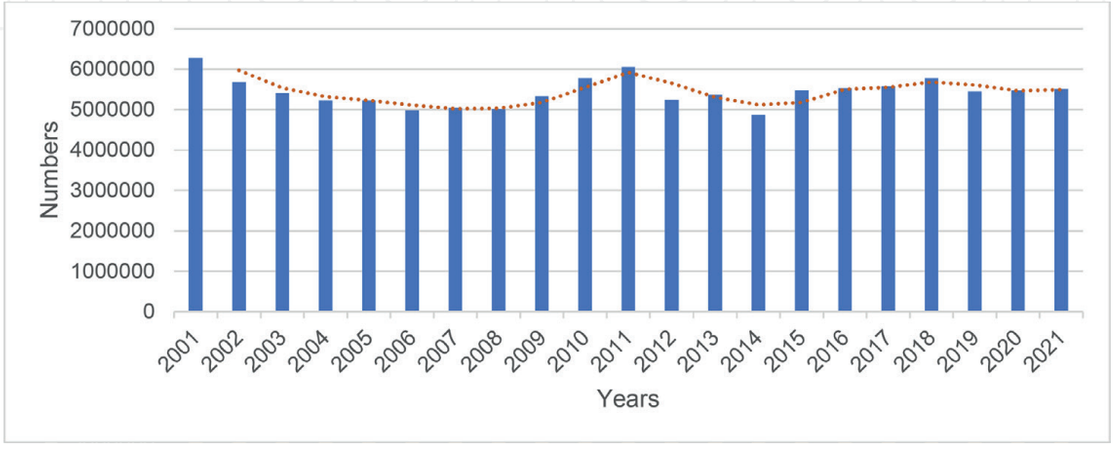

Figure 1.
Cattle populations, (2001–2021). Source: Ministry of Agriculture, Water and Rural Resettlement Reports [13–19].

as the Fast Track Land Reform Programme which saw several large-scale cattle farmers selling their cattle and some losing their farms [20, 21]. Nevertheless, the effects of hyperinflation, lack of access to credit, foreign currency shortages, unfavourable and cost of doing business conditions, and the high cost of critical utilities such as electricity, inappropriate breeds, inadequate feed supply, lack of government support, cost of production, poor marketing channels, poor disease control methods, inadequate infrastructure, weak extension support, among other factors [22–24].

From 2009 to 2011, there was a slight increase in the national herd from 5,331,000 to 6,058,388. Unexpectedly, growth in national herd increased from 5,241,192 to 4,868,357 between 2012 to 2014. Various cases of diseases emanated from foot and mouth, anthrax, black leg, lumpy skin disease and tick borne [13, 25]. Also, in 2015–2018 growth in national herd increased from 5,477,338 to 5,774,525. The year 2018 started with the continuation of the South-Eastern Lowveld cluster disease outbreak which spread mainly due to illegal movements and movements in search of grazing eventually covering twenty districts. Foot and mouth disease originating from Mozambique was precipitated by movement of Zimbabwean cattle deep inside the Mozambican territory to access water at time when Mozambique was experiencing a serious outbreak of foot and mouth disease in the area [14, 26]. From 2019 to 2021, national herd increased from 5,443,770 to 5,509,983. Though the national herd increased, calf mortality across provinces ranged from 2 to 31% which is against the recommended 2% and this was due to poor calf management, predation, poor housing and poor nutrition. The national average calving rates remain very low ranging from 35% in communal areas to 48% in large scale commercial farming sector, against a national target of above 60% [18].

3. Constraints to cattle production

In view of anticipated increases in temperature, decreases in rainfall and subsequent shortening of the growing season due to climate change, livestock production is expected to become a more sustainable livelihood source compared to cropping. Actually, there already are projections of increases in the global demand for cattle products by 2050, mainly due to improvements in the worldwide standard of living [27]. However, there are various constraints to cattle production such as nutrition, diseases and markets (**Table 1**). An improved comprehension of these constraints is necessary for development of strategies to increase sustainability of livestock production.

Nutrition and health are generally regarded as the main challenges of livestock production and productivity [3, 23]. Animal feeds are expensive, accounting for more than 70% of livestock production costs. During the dry season, there are limitations in both the quality and quantity of feed. The grazing resource is more available in the wet season than the dry season in which poor quality cereal stover constitute the bulk of the feed resource. Moreover, there is competitive use of the common feed ingredients like maize and soya bean between humans and animals. The productivity of the rangeland, which is the main feed resource in extensive livestock production has also been decreasing, due to unsustainable utilisation which can be partly attributed to increasing population growth, mismanagement, and adverse effects of climate change. Management factors which cause reductions in livestock production include uncontrolled breeding which causes inbreeding, poor housing and low adoption of routine health management practices such as vaccination and dosing [25]. For

Constraint	References
Feeds shortages and quality	[28–30]
Diseases and parasites	[5, 25, 31]
Markets and prices	[32, 33]
Breeds and breeding	[34–38]
Management	[25, 39]
Water access and quality	[23]
Extension service	[5, 23]
Capital and other financial resources	[40]

Table 1.
Constraints to livestock production.

instance, vector associated dermatophilosis, tick borne diseases, and parafilariosis are some of the common cattle health constraints.

Climate change has also caused a geographical shift in the occurrence of livestock diseases and parasites. Efforts to address the emerging diseases are hampered by increasing resistance to antibiotics. Resultantly, growth and reproductive performance of breeds that do not adapt to the prevailing climatic conditions are reduced. Similar to the grazing resource, water availability is also seasonal, with challenges of access experienced more in the dry season. The IPCC [41] anticipates even more water challenges due to decreases in precipitation resulting from climate change. Other limitations to livestock production include limited financial resources, e.g. capital, and extension services that offer veterinary or technical assistance. Market challenges in livestock production include low prices, high transport costs and shortages of buyers [36].

4. Use of indigenous knowledge systems in livestock health management in Zimbabwe

In the absence of funds, farmers face problems of scarcity, erratic supply and prohibitive costs of synthetic drugs or veterinary services and they usually revert back to sustainable traditional systems of animal health care [42]. In Zimbabwe, there is evidence that ethnoveterinary medicines are gaining recognition at the expense of conventional drugs especially because of greater accessibility, lower costs and apparent effectiveness [5, 12, 42, 43]. A study by [5] in Masvingo province has shown that farmers use plants that occur in their respective districts of the province. Farmers justify the potency of the ethno-veterinary remedies in relation to livestock's health and production performance in terms of feed intake, body weight, carcass size and quality [12, 44]. **Table 2** shows indigenous plants and remedies that are used to manage different cattle ailments in Zimbabwe.

There are several challenges downplaying the use of IKS in Zimbabwe. 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 [42]. 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 [12]. The fact that

Disease/ symptom	Local and scientific names of remedies	Method of treatment	References
Septic wounds	Muvengahonye (*Canthium* spp.)	Fresh leaves are ground and applied to the wound. Fresh leaves are ground and applied to the wound as a powder on the wound	[11, 42]
	Gavakava (*Aloe* spp.)	Dry leaves are crushed and the powder applied	[11, 42]
	Murenja (*Cissus quandrangularis*)	Fruit is crushed and the fluid applied to wound	[11, 42, 45, 46]
	Muvheva (*Kigelia africana*)	The inner core of dried fruit is applied as a powder on the wound	[11, 42]
Eye problems	Nhundurwa (*Solanum indicum*)	Fruit is crushed and the fluid is applied to the eye	[11, 42, 47]
	Snail's shell	Shell is ground to powder and applied to the eye	[11, 42, 47]
	Tomato leaves (*Lycopersicon esculentum*)	Animal made to drink crushed leaves and water mixture	[47]
Gastrointestinal worms	Muzhozho (*Venonia amygdalina*)	Add water to ground fresh leaves; animal made to swallow mixture	[11, 42]
	Banana (*Musa paradisiacal*)	Add water to crushed fresh roots; animal made to swallow mixture	[11, 42, 47]
	Gavakava (*Aloe* spp.)	Add water to crushed fresh leaves; animal made to swallow mixture	[11, 42, 47]
Bloat	Munhanzva (*Pauzzozi amixta*)	Leaves crushed and water added; animal made to swallow mixture	[11, 42, 46, 47]
	Chin'ai (*Phlegmostomium*)	Mix with table salt, add water; animal made to swallow mixture	[11, 42]
	Muhumbakumba (*Bridellia mollis*)	Soak bark and administer orally	[48]
Goitre	Mukwakwa (*Strychnos madagascariensis*)	Boil roots in water, cool and administer orally	[48]
Coccidiosis	Gavakava (*Aloe* spp.)	Grind fresh leaves and add to drinking water	[10–12, 42, 43]
	Mhiripiri (*Capsicum annum*)	Animal made to drink crushed fruit and water mixture	[47]
	Mucherenje/ Muwora (*Albizia gummisera*)	Animal made to drink suspension of powdered bark in water	[47]
	Muchakata (*Parinaria curatellifolia*)	Animal made to drink bark powder and water mixture	[47]
Retained afterbirth	Munhanzva (*Pauzzoziamixta*)	Fresh leaves are crushed and the slippery paste inserted into the vagina	[11, 42, 46, 47]
Lumpy skin disease	Muhumbakumba (*Bridellia mollis*)	Boil leaves in water and administer orally	[48]
Snake bite	Munyoka (*Amaranthusgneizaus*)	Add water to crushed fresh roots; animal made to swallow mixture	[11, 42]
	Mubhanana (*Musa paradisiacal*)	Add water to crushed dried roots; animal made to swallow mixture	[11, 42, 47]

Disease/ symptom	Local and scientific names of remedies	Method of treatment	References
Foot and mouth	Nhengeni (*Annona senegalensis*)	Administer sap from fruit orally	[48]
Dystocia	Munanzva (*Pouzolzia mixta*)	Crush bark, soak and administer orally	[48]
Fertility	Gomarara (*Loranthus* spp.)	Feeding fresh leaves to cows improves calving rate	[11, 42]
Delayed parturition	Murenja (*Cassius quandrangularis*)	Crush fresh stem and leaves, place in the vagina to hasten parturition	[11]
Fleas	Rutapatsikidzi (*Aneilema hockii*)	Branches of plant are placed near sleeping animals. Fleas are attracted by the herb and leave the animal.	[11]
Poor milk flow	Baobab (*Adanonsia digitata*)	Inner core of dried fruit is removed, added to water; animal made to swallow mixture	[11]
Diarrhoea/ Gastrointestinal problems	Gavakava (Aloe spp.)	Grind fresh leaves and add to drinking water	[10, 43, 46, 47]
	Mufandichimuka (*Myrothamnus flabellifoilius*)	Animal made to drink root powder and water mixture	[47]
	Rusungwe/ Nyakadombo (*Sarcostemma viminale*)	Animal made to drink stem powder and water mixture	[47]
	Mhiripiri (*Capsicum annum*)	Animal made to drink crushed fruit and water mixture	[47]
	Muchakata (*Parinaria curatellifolia*)	Animal made to drink bark powder and water mixture	[47]
	Murumanyama (*Xeroderris stuhlmannii*)	Animal made to drink crushed bark and water mixture	[47]
Fractures	Batanai (*Bulbophylum spp.*)	Bark is tied around fracture as supporting pad	[47]
Foot rot	Mushozhiwa (*Pseudolachnostylis maprouneifolia*)	Leaves or bark infusion taken through the mouth	[47]
External parasites	Murunjurunju (*Cissus quadrangularis*)	Crush stems and mix with water to spray	[49]
	Mopane (*Colophospermum mopane*)	Burn branches and twigs and apply ashes on animal skin	[49]
	Gavakava (*Aloe excelsa*)	Crush leaves, mix with water for 24 hours and spray	[49]
	Croton gratissimu	Use leaves and twigs	[46]
	Lippia javanica	Water leaf extracts sprayed on cattle	[50]

Table 2.
IKS remedies used to manage cattle health in Zimbabwe.

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.

Ethnoveterinary medicines are often not as fast working and potent as allopathic medicines and their use is time consuming in their preparation and use. The ethnoveterinary medicines may therefore be less suitable to control and treat epidemic and endemic infectious diseases and acute life-threatening bacterial infections. Paucity of treatment against the infectious epidemic diseases is another limitation of ethnoveterinary medicines. The preparation and use of ethnoveterinary medicines is often difficult and has inconveniences [5].

There is still need for the validation, documentation and acknowledgement of EVM in Zimbabwe among other tropical countries [42]. Additionally, socio-economic factors as population pressure, agricultural expansion into the veld, and other stress on the land may cause unsustainable consumption [5] It is not easy to standardise herbal therapies as the concentration of active ingredients varies in different parts of the plants [9]. 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.

Research and scientific validation of IKS, including EVM are therefore important to increase their adoption in livestock health management. The knowledge of traditional healers and experienced elderly people should be tapped to gather information on these practices so that the future generations can enjoy the same benefits [5]. The knowledge of traditional healers, stockmen, hunters, and other experienced elderly people may be the only ones with appropriate information regarding, for instance, the forms in which the drug has to be given for a particular disease: this information needs to be documented for the benefit of future generations [5, 42].

5. Conclusion

Conventional veterinary services have played a paramount role in the control of livestock diseases. The conventional veterinary services cannot yet deliver complete coverage in preventive and curative health care practices because of inadequate labor, logistical problems, erratic supply of drugs, and the high cost of drugs and equipment. In Zimbabwe, there is evidence that ethnoveterinary medicines are gaining recognition at the expense of conventional drugs especially because of greater accessibility, lower costs and apparent effectiveness. A practical solution to cutbacks in veterinary services is to develop socially acceptable and effective remedies from reasonably inexpensive sources that can complement modern medicine like ethnoveterinary medicines.

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