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Mini Review

Ethnoveterinary medicine in African organic poultry production

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Abstract

This review of literature gives an overview of the current and previous efforts on the use of Ethnoveterinary medicine in African rural and organic commercial poultry production. Background information on the use of Ethnoveterinary medicine in Africa is presented. Problems faced in the use of Ethnoveterinary medicine are outlined. Some literatures of repute are listed in to spur further research into the use of Ethnoveterinary medicine and practices in African poultry production. This paper concludes that ethnoveterinary medicine in relation to organic livestock production need to be integrated into the policy frameworks, extension delivery system and livestock training curricular of African nations.

Introduction

The advent of organic farming in the developed countries of the world and the resultant push for the use of more environmentally friendly and humane methods of raising animals gives a lot of hope for the utilization of traditional knowledge and Ethnoveterinary medicine in Africa. Rural and commercial poultry productions stand chances of tremendous boost through the use of Ethnoveterinary medicine, considering the vast biodiversity of Africa. The African traditional way of rearing livestock originally uses less of synthetic drugs, although the birds raised are hardy in nature. There is therefore the need for the use of traditional veterinary knowledge of local African farmers as a basis for the development of organic alternatives of livestock production. ICS-UNIDO (2004) estimated that about 80% of the African population relies on traditional medicine for meeting healthcare needs. The primary aim of this work therefore is to review literature on the current and previous efforts on Ethnoveterinary medicine in the African continent.

African biodiversity

Africa is the world's second largest continent after Asia, both in terms of area and population. The continent has a unique diversity of geographic and climatic factors and exceptionally rich, varied flora with an estimated 68,000 plant species, of which about 35,000 are known to be endemic. Medicinal plant resources in Africa are also the major source of income. In addition to domestic trade, medicinal plants are widely exported in large volumes to the international market. The continent comes second to Asia in export figures (ICS-UNIDO, 2004)

Medicinal plants, and the drugs derived from them, are the most important and readily available source of health-care remedies to rural people in Africa. In eastern Africa, many biological resources are used for obtaining pharmaceuticals that have a high national and international economic value. West Africa is the home to one of the world's largest rainforests constituting many medicinal plant species of commercial importance. There are about 3,000 medicinal plant species in southern Africa of which 10% have found common and widespread uses in traditional healthcare systems. Northern Africa has about 10,000 plant species of which around 70% are known to be valuable as food and medicines among other uses. Over 10% of the region's floristic diversity has potential for commercial exploitation and half of them are underutilized as reported by ICS-UNIDO (2004)

About 80% of the African population relies on traditional medicine for healthcare needs. Some people use traditional medicine only, while others combine it with conventional drugs. The use of medicinal plants by local people accounts for 70% or more of basic health-care treatments in Africa.

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Traditional medical practitioners (TMPs) are a crucial component of the health-care delivery system. Medicinal plants are used mainly in local, traditional medicine rather than exported to foreign markets. Demand is increasing and often exceeds supply. (Karan and Vishavjit, 2004)

Justification for organic poultry production in Africa

Almost all chemicals administered knowingly or unknowingly to animals in the conventional poultry production system result in some trace residue remaining in the carcass (Gracey and Collins, 1992). This may be one of the reasons for the increased advocacy for the exclusion of antibiotics and hormone growth promoters in the rearing of meat birds. Access to safe and healthy food products has now become an important public concern in the developed countries of the world, since consumers now demand for food that are not only economical, but also healthy, tasty and safe (Boehlje and Hurt, 1996)

Basic features of organic livestock farming

Organic poultry production focuses on alternative production systems that centre on the rearing of birds on a cage-free environment with outdoor access as alternatives to conventional poultry housing and cages. Outdoor access is an important feature of organic poultry farming. Organic feeds, preventive healthcare management system and the use of probiotics are other important features of this method of poultry production. Other standards in organic poultry faming includes allowance for fresh air, direct sunlight, and exercise in the rearing and management of the birds (ICS-UNIDO, 2004)

In the principle of organic livestock farming, poultry birds should be kept in such a manner that they can express their natural behaviours like dust bathing, foraging and perching. Respect must be given to the species-specific characteristics of birds in organic farming; this means that no mutilations like beak trimming or debeaking is allowed. So whenever welfare problems occur, solutions should primarily be sought at the systemic level instead of adapting the animals to the system. (Alrøe *et al*., 2001)

The most ethical way to grow poultry is to grow them on pasture. This allows for the birds to be handled in a low-stress way. They are allowed to be in the fresh air after three weeks of age. This affords them the opportunity to live their normal lives by scavenging, dust bathing and perching. They are not subjected to living on and pecking at their own droppings and have fresh, green, growing grass available to them at all times. Organic chickens have to be fed organic feed, which means that it has been produced without chemical additions on land that has not had such chemicals applied for at least three years.

Ethnoveterinary medicine in poultry production: The African perspective

Indigenous poultry production in Africa has been relegated to the background, because of its low productivity, and is frequently considered by farmers as an insignificant occupation compared with other agricultural activities. Poultry diseases seriously affect village chicken production. Birds are almost never vaccinated. Very occasionally they receive an antibiotic tablet originally intended for human use (Gueye, 1997).

Ethnoveterinary medicine application in African rural poultry production

Indigenous knowledge has gone a long way over the years to ensure minimal livelihoods for the rural resource-poor people in Africa. Most small-holder farmers that desire to adopt modern practices of animal health care are constrained by lack of finance and unavailability of consultancy advice from veterinary officers in remote African villages (Kolawole, 2001). The rural / village poultry system in Africa typically lacks access to organised health inputs. The structure of the rural poultry production system in Africa has constrained attempts to institute health extension services. Small flock size, mixed age and species flock composition, improper housing, scavenging, among other factors have made the use of conventional schedule-oriented health inputs like medication and vaccination difficult. Conventional poultry health packages are designed for the commercial sector and therefore feature large dose-packages usually for hundreds or thousands of birds.

Justification for Ethnoveterinary medicine in organic poultry production

Many factors pave the way for the use of alternative remedies in African organic poultry production, some of which are: The toxic effects of synthetic drugs on humans (Kaemmerer and Butenkotter, 1973; Murray *et al*., 1992), the development of resistance to synthetic drugs by target parasites (Maingi *et al*., 1996), high cost of synthetic drugs (Chema and Ward., 1990) and Herbal therapies are natural products, environmentally friendly and cheap (Fajimi and Taiwo, 2005).

Use of plant products in the treatment of poultry diseases in African rural poultry production

Many plant products have been reported to be in

Table 1. Selected literature on ethnoveterinary plants used to treat poultry diseases in africa (by region) West Africa

Country	Diseases / Purpose	Target Animals	Plant specie [Plant part(s) utilized]	Application Form	Source
Benin	Various ectoparasites	All poultry species	*Elaeis guineensis* [oil]	Paint affected birds with a mixture of the oil and a little salt	Assan, 1990
Burkina Faso	Newcastle Disease	Chicken	*Combretum micrantum* [bark] with *Butyrosperinium parkii* [bark] and *Ficus spp* [bark]	Dried, ground and soaked in drinking water	Tamboura *et al.*, 1998
	Newcastle Disease	Chicken	*Lamnea acida* [bark]	Soaked in drinking water	Tamboura *et al.*, 1998
	Various ectoparasites	All poultry species	*Butyrospermum parkii* [oil]	Mix with same volume of liquid potash and paint affected birds	Tamboura *et al.*, 1998
Ghana	Fowl pox	All poultry species	*Elaeis guineensis* [oil]	Smear scabs	Williams, 1990
Mali	Newcastle Disease	Guinea Fowl	*Cassia Siebertiana* [bark]	Used as Infusion	Nomoko, 1997
Niger	Diarrhea	All poultry species	*Sclerocarya birrea* [bark]	Used as decoction	Puffet, 1985
Nigeria	Newcastle Disease	All poultry species	*Parkia filicoidea* [bark]	Put into drinking water	Nwude and Ibrahim , 1980
	Cholera	All poultry species	*Adansonia digitata* [fruit]	Broken and given in drinking water	Nwude and Ibrahim , 1980
	Fever	All poultry species	*Allium sativum* [chopped bulb] and *Capsicum annuum* [whole fruit]	Added and given orally	Nwude and Ibrahim, 1980
	Fever	All poultry species	*Cyperus articulatus* [fruit]	Soaked in drinking water	Nwude and Ibrahim , 1980
	Poor growth, low production	All poultry species	*Cucumis pustulatus* [fruit]	Mixed with bran and placed in drinking water	Nwude and Ibrahim , 1980
	Poor growth, low production	All poultry species	*Cyperus articulatus* [fruit]	Soaked in drinking water	Nwude and Ibrahim , 1980
	Diarrhea	All poultry species	*Boswellia dalzielli* [young leaves]	Added to drinking water	Nwude and Ibrahim , 1980
	Worms	All poultry species	*Solanum nodiflorum*	Soaked in drinking water	Nwude and Ibrahim , 1980
	Coccidiosis	All poultry species	*Lagenaria vulgaris* [fruit]	Dipped in drinking water	Nwude and Ibrahim , 1980
	Blackhead disease		*Solanum incanum* [fruit]	Broken and dipped in drinking water	Nwude and Ibrahim , 1980
	Lameness of Ducks	Ducks	*Momordica balsamina* [leaves]	Pulverized and mixed with food	Nwude and Ibrahim , 1980
	Ectoparasites	All poultry species	*Carica papaya* [leaves]	Leaves burnt into ashes and used topically	Nwude and Ibrahim , 1980
	Growth promoter	Chickens	*Garcinia kola* [dry seed powder]	Seed dried and ground into powder and included in feed	Adedeji *et al.*, 2006 a, b
	Newcastle Disease	Chickens	*Lagenaria breviflora* [fruits] and *Capsicum frutescens* [fruits] (hot pepper)	Put into drinking water	Sonaiya *et al.*, 1992
	Lameness of Ducks	Ducks	*Lagenaria breviflora* [fruits]	Legs are held in a bowl of water containing sliced fruits. This is repeated several times a day	Sonaiya *et al.*, 1992
	Coccidiosis, Helminthiasis	All poultry species	*Khaya senegalensis* [barks]	Mix soap with dried, powdered barks and add to drinking water. Pound dried stem together with red potash and add to drinking water.	Gefu *et al.*, 2000
	Helminthiasis	All poultry species	*Terminali avicennoides* [stem bark]	Pounded dried stem barks with red potash or cooked roots with red potash added to drinking water	Gefu *et al.*, 2000
	Helminthiasis	All poultry species	*Allium cepa* [bulb, green leaves]	For ducks, drop bulb in drinking water. For chickens, use green leaves to be picked by birds	Gefu *et al.*, 2000
	Worm infestation	All poultry species	*Citrus aurantifolia*	Mix juice with drinking water and add small red potash	Gefu *et al.*, 2000
	Coccidiosis and amoebic dysentery	All poultry species	*Boswellia dalzielli* [stem barks]	Pounded stem barks added to drinking water for 2-3 days	Gefu *et al.*, 2000
	Coughing, diarrhea and leg weakness	Turkeys	*Citta spp* [Ginger] or *Capsicum spp* [fruit]	Put into drinking water	Maigandi and Usman, 1996
Senegal	Newcastle Disease	Chicken	*Khaya senegalensis* [bark] and *Capsicum spp* [extracts]	Soaked in drinking water	Guéyé , 1988a
	Various endoparasites	Chickens	*Capsicum spp* [extracts] *Azadirachta indica* A. Juss [leaves or barks]	Added to drinking water	Guéyé, 1997
The Gambia	Newcastle Disease	Chicken	*Mangifera indica* [barks]	Put into drinking water	Bonfoh, 1997
Togo	Diarrhea	Chickens	*Peltophorum ferrugineum* [broken pepper] or *Adansonia digitata* [bark]	Used as infusion	Lobi., 1984
	Locomotion trouble	Chickens	*Borreria verticillata* [leaves]	Used as infusion	Lobi., 1984
	Various ectoparasites	All poultry species	*Butyrospermum parkii* [oil]	External use	Lobi, (1984
	Fowl pox	All poultry species	*Elaeis guineensis* [oil]	Paint affected birds	Aklobessi, 1990
The entire West African region	Various ectoparasites	All poultry species	*Derris elliptica* [roots]	Infested birds and their houses drenched with the mixture of powdered roots of *Derris elliptica*, soap and water	Matzigkeit, 1993
	Diarrhea	Turkeys	*Pergularia extensa* [chopped up leaves]	Used as feed	Dalziel, 1937

Central Africa

Country	Diseases / Purpose	Target Animals	Plant specie [Plant part(s) utilized]	Application Form	Source
Cameroon	Diarrhea	All poultry species	*Carica papaya* [leaves]	Used as infusion	Agbédé *et al.*, 1995
	Cough	Chickens	*Pipper guineense* [fruits]		Agbédé *et al.* 1995

East Africa

Country	Diseases / Purpose	Target Animals	Plant specie [Plant part(s) utilized]	Application Form	Source
Ethiopia	All diseases	Chicken	*Eucalyptus spp*	Put into drinking water	Dessie, 1996
	All diseases	Chicken	*Capsicum frutescens* [fruit] (hot pepper)	Soaked in drinking water	Dessie, 1996
	Various ectoparasites	Chickens	Wood ash	External use	Dessie, 1996)
Kenya	Newcastle Disease	Chicken	*Mucuna spp* [leaves]	Crushed leaves soaked in drinking water. Mixture filtered and given in lieu of drinking water for 3 days	CTA, 1996
	Newcastle Disease	Chicken	*Amaranthus hybridicus* var *cruentus* [leaves and flowers] with *Capsicum spp* [fruits] and *Aloe secundiflora* [leaves]	Crushed leaves soaked in water for 6 hours. Mixture given in lieu of drinking water or drenched with 2 tablespoonfuls twice a day.	CTA, 1996
	Newcastle Disease	Chicken	*Agave americana* [leaves] with *Capsicum spp* [fruits] and soot	Chopped pepper added to crushed leaves and juice extracted. Mixture given in lieu of drinking water. Repeat once a day until recovery.	CTA, 1996
	Newcastle Disease	Chicken	*Aloe spp* [leaves]	Add water to crushed leaves. Given as drinking water.	CTA, 1996
	Cough, colds and pneumonia	Chickens	*Colocasia esculenta* [tuber]	A whole tuber (about 0.5kg) washed and ground in a mortar, 2 litres of water added and the mixture sieved. 3 drops are given once in the nostrils of each fowl.	CTA, 1996
	Fowl pox	Chickens	*Microglossa pyriflora* [roots] with *Agave sisalana* [leaves] and *Aloe spp* [leaves]	2 parts *Microglossa pyriflora* roots mixed with 1 part *Agave sisalana* leaves and 1 part *Aloe spp* leaves boiled in water for 30-45 minutes and given as drinking water to infected birds	CTA, 1996
	Fowl pox	Chickens	*Allium sativum* [bulbs]	2 bulbs, chopped or ground, mixed with 4litres of water and used to wash birds daily until the birds are lice-free	CTA, 1996
Somalia	Diarrhea	All poultry species	*Aloe veroe* [juice]	Given orally	Lul, 1990
Tanzania	Newcastle Disease	All poultry species	*Euphorbia candelabrum* kotschy var *candelabrum* [stem] or *Capsicum annuum* [fruit] together with *Iboza minutiflora* [leaves]	Put into drinking water	Mkangare, 1989
	Newcastle Disease and other diseases	Chicken	Hot pepper, elephant faeces, sisal leaves and leaves from plants locally known as 'Chunga', 'Hunduhundu' and 'Mwambalasimba'		Mwalusanya, 1998
Uganda	Diarrhea and fowl pox	Chickens	Herbs and Chilli pepper		Okot, 1990

use already in the various regions and countries of Africa for the treatment of poultry diseases. These plant products are locally available and free or very cheap. Moreover, studies are needed under controlled conditions on the efficacy rates and veterinary properties of such plant products and treatments. Some literatures of repute are herein listed to spur further research on the use of Ethnoveterinary medicine and practices in African organic poultry production. A lot of work has been done in the Western, Eastern, and Southern regions of Africa. Little has been obtained in the central African region, with none for the North African region. This may be partly due to the prevalence of ruminant rearing in the region, as compared to poultry keeping (Table 1).

Status of Ethnoveterinary medicine application in African organic commercial poultry production

Commercial organic poultry farming is seen as more beneficial than other forms of organic meat production because the animals take up less space and the consequent requirement for land acquisition is reduced. They grow to sellable size relatively quickly than their ruminant counterparts. Because organic poultry are raised without antibiotics, money can be saved on drugs, but more attention will have to be paid to the management of flock health. This may not be a problem to family poultry production as it is to commercial poultry production. Organic poultry have to be fed organic feed, which means that it has been produced without chemical additions on land that has not had such chemicals applied for at

Southern Africa

Country	Diseases / Purpose	Target Animals	Plant specie [Plant part(s) utilized]	Application Form	Source
Botswana	Eye infections	All poultry species	*Pseudognaphalium luteo-album* [leaves] and *Diospyros lyciodes* [root powder]	Exudates used as eye drops	Moreki, 1997
	Diarrhea	All poultry species	*Cassia abbreviata* [roots] and *Senna italia* [roots]	Ground into powder and added into drinking water	Moreki, 1997
Zimbabwe	Bloody and watery Diarrhea	All poultry species	*Adenium multiflorum* [bulb]	Soaked in water and birds drenched after 12 hours	Chavunduka, 1976
	Bloody and watery Diarrhea	All poultry species	*Aloe chabaudii* [latex] or *Euphorbia matabelensis* [latex]	Added to drinking water	Chavunduka, 1976
	Blood in the excreta	All poultry species	*Cussonia arborea* [bark]	Soaked in water and birds drenched with fluid	Chavunduka, 1976
	Various respiratory infections	Chickens	*Capsicum annum* and *Capsicum frutescence* [fuits]	Pulverized and small amount of a mixture of the fruits with a little salt added to drinking water	Chavunduka, 1976
	Various respiratory infections	Chickens	*Euphorbia matabelensis* [latex] or *Nicotiana tabacum* [leaves]	Added to drinking water	Chavunduka, 1976
	Eye trouble	Chicken	*Cycnium adonense* [leaves]	Decoction given to newly hatched birds to open gummed-up eyes	Chavunduka, 1976
	Sore eyes	All poultry species	*Adenum multiflorum* [bulb]	Juice used as eye drops	Chavunduka, 1976
	Various nervous symptoms	All poultry species	*Zea mays* [grains]	Roasted and given hot	Chavunduka, 1976
	Fowl pox	All poultry species	*Aloe excelsa* [leaves]	Soaked in drinking water	Chavunduka, 1976
	Various ectoparasites	All poultry species	*Aloe chabaudii* [latex solution]	Affected birds dipped in a diluted solution	Chavunduka, 1976
	Various ectoparasites	All poultry species	*Annona stenophylla* [roots]	Soaked in drinking water	Chavunduka, 1976
	Newcastle Disease	All poultry species	*Cassia didymobotrya* [leaves] OR *Euphorbia metabelensis* [latex]	Put into drinking water	Chavunduka, 1976
The entire South African region	Enteritis and indigestion	All poultry species	*Aloe saponaria Haw* [leaves]	Cold infusion	Watt and Breyer-Brandwijk, 1962
Southern and Eastern Africa	Influenza	Chickens	*Nicotiana glauca* [watery extracts]		Watt and Breyer-Brandwijk, 1962

least three years.

Organic feed is more expensive than conventional feed, but organic poultry products have been reported in developed countries to attract higher price premium than their non-organic counterparts due to the high levels of awareness organic products have gained there.Little is known so far of the extent to which African commercial farmers adopt ethnoveterinary practices in the rearing of their birds. More work is required in this area.

Problems faced in the use of Ethnoveterinary medicine in Africa

There are certain problems faced by local African farmers in the use of ethno-veterinary approach to treat animals. These problems as outlined by Mathias and McCorkle (1989) and other authors include: inconveniences involved in the use or preparation of certain remedies, seasonal availability of some medicinal plants, paucity of treatments against epidemic diseases, existence of harmful practices, difficulty of standardizing herbal remedies (since the concentration of a critical ingredient in a plant often varies from one location to another), vagueness of local treatment schedules, paucity of information on preventive measures against diseases and variations in belief systems make some Ethnoveterinary practices unacceptable, particularly those that are religion-based

Conclusions and Recommendations

Numerous plants indigenous to Africa have been found with amazing medicinal properties. Some are well-evaluated in relation to their content of specific active principles against the target parasites while others are not. Some have been validated while others are not. There is a great need for the promotion of organic poultry farming principles in the African continent to tap into the international market for organically produced poultry products. Foreign exchange preservation and earning is guaranteed if this is vigorously pursued. African governments also need to give priority to the promotion of local indigenous knowledge for the purpose of discovering the medicinal and pharmaceutical use of the local flora.

If ethnoveterinary medicine can be enmeshed into the livestock policy frameworks of African countries, this will go a long way into helping the livelihood of many poor families of Africa. More work need to be done in the discovery, documentation and validation of local ethnoveterinary practices in Africa. Plants of ethnoveterinary importance whose properties have not been fully characterized and documented need be given good attention by African researchers. Awareness must be raised for the need to exploit the possibility of discovering more medicinally viable plants in the African biodiversity. Inclusion of ethno-veterinary medicine and organic livestock farming in animal science and veterinary curricular in African universities shall go a long way in aiding improving the awareness needed for the development of these novel ideas. Integration of ethnoveterinary medicine in livestock extension delivery systems is also of paramount importance. While commercialization of organic poultry production should be encouraged and advocated.

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