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Medicinal plant extracts widely used in the control of Newcastle disease (NCD) and helminthosis among village chickens of South Western Uganda

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Abstract

The study was carried out in the south western agro-ecological zone (SWAEZ) of Uganda and it involved the districts of Bushenyi, Mbarara and Rakai. There is lack of information on the common medicinal plant extracts for poultry disease management in the SWAEZ. Also common poultry diseases and current management practices in the zone are not adequately documented. Yet, the typical village chicken farmers rely on medicinal plants in the control of Newcastle disease and helminthosis. A survey was conducted to establish an inventory of medicinal plants and the common poultry management practices used in the management of Newcastle disease and helminthosis. A total of 87 questionnaires were administered to poultry farmers. Veterinary extension workers were also involved for triangulation of information. The majority of the farmers (80%) were peasant farmers keeping on average 27 village chickens per household. The farmers had an average experience in poultry keeping of 2 to 3 years. About 45% of the farmers use traditional medicine, 37% use a combination of traditional and modern veterinary medicine while 17% use only modern veterinary medicine.

There was a statistically significant relationship between the methods used to treat poultry diseases and the location (Bushenyi, Mbarara and Rakai) shown by ($\chi 2 = 13.965$, $P = 0.007$); commercial feeding ($\chi 2 = 16.139$, $P= 0.000$); commercial treatment for poultry ($\chi 2 = 16.471$, $P = 0.011$); and prophylactic treatment of poultry diseases ($\chi 2 = 38.189$, $P = 0.058$).

The results of the multi nominal logistic regression analysis of the variables namely; district, feeding, vaccination, prophylaxis and government services provision were not significant. Although herbal drugs are used in the poultry disease management there are information gaps related to efficacy, safety, dosage and active substances of these plants. Information on these variables is unknown. It is therefore recommended that further research be undertaken on these research gaps.

Key words: Capsicum annum, Erythrina abbyssinica, poultry diseases

Background

Medicinal plants are vital to sustainable resource use and balanced development (Kolawole et al 2007). It has been observed that the commercial Newcastle disease (NCD) vaccine and commercial dewormers are rarely used by the village chicken farmers to control NCD and helminthes in village chickens (Olila et al 2007). They instead rely on medicinal plants to control these diseases.

The commonly used medicinal plants in the control of animal diseases have been documented by Intermediate Technology Development Group (ITG) and International Institute of Rural Reconstruction (ITDG and IIRR) (1996) in Kenya; Nsubuga- Mutaka et al (2005) in SWAEZ. Ejobi and Olila (2004) documented a total of 182 plants traditionally used for treating

livestock diseases and conditions in the Teso sub-region of Uganda. A recent study by Ejobi et al (2007) reported a total of 24 plants traditionally used by the Bahima pastoralists in Rakai district for treating livestock diseases. About 20% of the plants reported in that study, were traditionally used for controlling gastro-intestinal parasites in the central, eastern and western regions of Uganda (Katunguka-Rwakishaya et al 2004; Olila et al 2007).

There is lack of information on the common medicinal plant extracts for poultry disease management in the SWAEZ (Olila et al 2007). Also common poultry diseases and current management practices in the zone are not adequately documented. Yet, the typical village chicken farmers rely on medicinal plants in the control of NCD and helminthosis. Under field conditions, NCD causes between 50-100% mortality among chickens (Jensen 1996; Jordan and Alderson 2009 and Alders et al 2009). Helminthosis in severe forms retards growth of growing chickens leading to loss of productivity (Tadelle 1996; Kitalyi et al 2005; Alders and Pym 2009; Jordan and Alderson 2009). The purpose of this study was to find out medicinal plants and the poultry management practices commonly used by the local farmers for the management of NCD and helminthosis in the SWAEZ.

Materials and methods

Study area

The study was conducted in the SWAEZ of Uganda in the sub counties of Bugongi (Bushenyi), Rubindi (Mbarara) and Luanda (Rakai). The zone is located along longitude 0^0 35' South and latitude 30^0 35' East. These areas were selected because recent livestock census indicated that they had high populations of village chickens in the SWAEZ (UBOS and MAAIF 2008). In 2008, Uganda's chicken flock was estimated to be 37.4 million. The western region has 7.2 million chickens, which accounted for 19.3% of the national flock (Ministry of Agriculture Animal Industry and Fisheries (UBOS and MAAIF) and 2008). The chicken population in SWAEZ is presented in Table 1.

Table 1. The chicken population across the districts in the SWAEZ

District	Chicken Population
Rakai	503,623
Bushenyi	364,568
Mbarara	239,470
Isingiro	203,560
Sembabule	194,462
Ntungamo	184,760
Ibanda	144,301
Kiruhura	142,459
Lyatonde	73,588

Source: (UBOS and MAAIF 2008)

Exclusion and inclusion criteria

Involved identification and selection of farmers who kept a minimum of 20 indigenous chickens per household. Thus Bugongi (Bushenyi), Rubindi (Mbarara) and Luanda (Rakai) had 35, 30, and 30 households respectively.

Sample size estimation and selection

The sub counties were purposively selected from the districts. The numbers of participating farmers were sampled using Morgan and Krejcie (1970) tabulation from the households in the sub counties. The samples for the questionnaires were randomly selected using the lottery method from the sampling frame of those smallholder households who kept village chicken in Bushenyi (30), Mbarara (28) and Rakai districts (29). A third of the samples participating in the questionnaires were purposively selected to take part in the key informant interviews. Out of the 87 farmers interviewed 34 were females and 53 were males. According to UBOS and MAAIF (2008), (80%) of the farmers interviewed were peasant farmers.

Study design

A survey was used to establish the inventory of the common plants used and the poultry management practices by the farmers in the districts of Bushenyi, Mbarara and Rakai. Semi-structured questionnaires interviews were used in triangulation with focus group discussion (FGD) and key informants (KI) interviews.

The study instruments namely the questionnaires, the FGD checklist, and the KI key informant guides were designed to collect data on socio-economic characteristics of the poultry farmers, poultry production and management, poultry diseases and their control, medicinal plants, preparation methods and quantities administered, advantages of medicinal plants and perceptions of the farmers on veterinary services provision. The indigenous technical knowledge (ITKs) were ranked based on the frequencies from the number of times each herb, plant was mentioned and agreed in the focus group discussions. The data generated from the interviews were triangulated with information given by Veterinary Officers (VO's) and extension staff.

Data collection methods

A total of 87 semi-structured questionnaires were administered to the poultry farmers (30 in Bushenyi, 28 in Mbarara and 29 in Rakai). The questionnaires were administered by combined efforts of researchers and veterinary extension staff to the farmers by reading the questions and recording the answers. During the interview process information on common poultry diseases were deduced using the clinical signs described by the farmers in order to diagnose the poultry diseases. Data on medicinal plants were collected by asking the names of the plants commonly used in poultry disease management, their concoction, quantities and administration. Names of the plants were thus translated in English using the local and scientific nomenclature. The plants and their ingredients were recorded in the questionnaire and entered in Excel file for analysis to get averages of quantities used.

The level of confidence that the herbal concoctions work well were ranked by show of hands and general consensus in a group discussion and also use of pair-wise ranking participatory technique indicating high, medium and low pointing to the degree of effectiveness.

Reliability and validity: pre-testing of the questionnaires was done to look at internal consistency of the questionnaires. Face and content validity was used to ensure validity.

Data analysis:

Data were analyzed using intercooled STATA.14. The socio-economic characteristics of the poultry farmers, the poultry numbers and types kept were summarized into means, frequencies, and standard deviations. Chi-square tests were carried out to determine the relationships between the choice of methods used to treat poultry diseases and some management parameters. A multi nominal logistic regression analysis was run to look at the level of statistical significance between methods of choice of poultry treatment and variables like district, feeding types, vaccinations, prophylaxis and provision of government services.

Results

Socio-demographic characteristics of the farmers

The majority of the farmers in the three districts have reared poultry for at least 2-3 years. Overall, 18% of the households on average reared poultry for six months. Another 18% on average were engaged in poultry rearing for 1 year. A combined 43% of the households on average were engaged in poultry rearing for more than 4 years. In all the three districts, village chicken rearing was an important activity for quick source of family proteins, ready food for visitors, and quick source of family income. Village chicken rearing was not a new enterprise in the SWAEZ.

Poultry management system

On average the households' keep about 27 local chickens. This trend has a bearing on the utilization of inputs for proper chicken husbandry practices. A total of 43 commercial layers, 74 commercial broilers on average were kept by the households. It was noted that few ducks and turkeys were reared by the households as seen in Table 2 and Figure 2.

Table 2. Types of poultry management systems

Variable	Observations	Mean	Std. Dev.	Min	Max
Local chicken	84.0	27.1***	36.6	3.00	200
Commercial Layers	16.0	43.0	46.7	4.00	150
Commercial Broilers	3.00	74.7	126	2.00	220
Ducks	6.00	7.17	6.65	2.00	20.0
Turkeys	4.00	7.50	8.74	1.00	20.0

The few ducks and turkeys kept could be explained by the fact that traditionally the farming households at SWAEZ do not rear ducks and turkeys. The few documented were due to pressure to diversify enterprises. The limited number of commercial layers and broilers kept could be explained by the low capital base, low inputs and low capacity to expand into commercial chicken enterprises.

Generally 48.8% of the farmers on average in Bushenyi, Mbarara and Rakai districts practiced free range system, 39.5% practiced semi-intensive management system and 11.63% practiced intensive management system as illustrated in Figure 3. The commercial layers and

broilers were intensively kept compared to village chickens which were kept semi-intensively and under free range. The choice of management system was dependent on the numbers of chickens kept, the types of chicken kept and the size of household capital base.

It was noted that a total of 36.7% households in Bushenyi, 89.3% in Mbarara and 27.6% in Rakai districts kept their birds under temporary housing . A total of 50% in Bushenyi, 11% in Mbarara and 3.5% in Rakai districts reared chickens under semi-permanent housing and 13% in Bushenyi, 68% in Rakai kept their birds in permanent structures as illustrated in Figure 4. It is important to note that housing is an important management structure in poultry rearing. The nature of poultry housing is dependent on poultry types, capital and scale of chicken rearing.

A total of 49.4% of the farmers fed commercial feeds while 50.6% left their birds on free range.. The type of feeds given to chicken is dependent on how fast they make returns on investment and nature of the birds kept. Commercial layers and broilers were more likely to be fed on commercially manufactured feeds compared to village chickens on free range system that grow slowly. This contrasts with broiler chickens which grow fast and attain market weight at 8 weeks of age when fed on balanced commercially manufactured feeds.

Water sources for the poultry in all districts were shallow well (57.1%), rain water (20.2), tap (13.1%), tank (4.76%) borehole water (2.38%), and free range (2.38%).

In Bushenyi district most of the water sources were rain water and shallow well which were unprotected. In Mbarara the sources of water included borehole, rain water, shallow well, tank and tap. In Rakai the water sources for the birds were from borehole, rain, shallow well and tank water.

Supplementation overall, in the districts of Bushenyi, Mbarara and Rakai 70.67% of the farmers supplemented their poultry with green plants, 9.33 % with maize seeds/ bran, 8.0% with food left over's and 0.33% with herbs while 10.67% did not supplement their birds detailed in Table 3.

Table 3. Supplementation of birds in Bushenyi, Mbarara and Rakai districts

Feed supplements	**Districts**			
	Bushenyi, %	**Mbarara, %**	**Rakai, %**	**Average, %**
Green plants	92.3	66.7	52.0	70.7
Maize bran	3.85	0.00	24.0	9.33
Food leftovers	3.85	0.00	20.0	8.00
Herbs	0.00	4.17	0.00	0.33
No supplements	0.00	29.2	4.00	10.7

**** Most of the farmers in the SWAEZ fed green plants as supplements to the chickens*

Supplementation is very important in adding vital feed ingredients to basal feeds that may be supplied in insufficient amounts to village chickens. The main essential ingredients include vitamins, minerals and proteins. The level of supplementation of the chickens is dependent on the level of intensification and the types of birds kept and scale of chickens reared.

It was observed that total of 41.3% of the farmers used commercial drugs while the remaining 58.7% used herbs. The common commercial drugs used included *Piperazine hydrochloride (*Ascarex*), Albendazole hydrochloride (*Wormicid*), Levamisole hydrochloride (*Levacide*),* amprolium (Coccid) etc. The common herbs used include *Capsicum annum* (red pepper) against NCD management and *Erythrina abbyssinica* (Ekiko) for helminthes control.

The different commercial and herbal drugs may be used independently of each other or in combination. The drugs were used mainly in the management of bacterial, viral, protozoan, fungal, parasitic and non infectious causes of diseases in poultry. Diseases are a menace in poultry rearing. They retard growth especially in chicks, leads to reduction in egg production and also high mortalities especially due to NCD.

Vaccinations

A total of 45.5% of the poultry farmers used herbal drugs for prevention of birds against immunisable diseases, 47.3% use commercial vaccines while 7.28% of the farmers used both herbal and commercial drugs.

Prophylaxis

The common commercial prophylactic drugs included Furazolidone, cocciodiostats, amprolium and oxytetracycline. Herbal drugs include *Aloe vera, ash* and *Capsicum annum* (red pepper).

Poultry diseases and their management

The common diseases of poultry in the districts were NCD, coccidiosis, salmonellosis, helminthosis/worms infectious bronchitis. The common parasites included mites and fleas. Other management related vices included egg eating, cannibalism etc.

In the present study, 45.1% of the farmers used traditional medicine, 17.1% modern medicine, 37.8% a combination of traditional and veterinary medicine against poultry diseases and parasites.

The choice to use traditional medicine is dictated by past experience in managing similar conditions and evidence of past recovery, poultry types kept, capital levels and scale of chickens. Large commercial layers and broilers were mainly treated using modern veterinary drugs.

When various herbal drug concoctions were used 29.0 % of the farmers reported full recovery of the flock, 39.5% reported partial recovery resulted, 17.1% believed some birds survived and 14.5% showed symptomatic recovery.

Veterinary services delivery in Bushenyi, Mbarara and Rakai districts

Overall, 42.5% of the farmers reported government veterinarians treating their sick poultry i.e. 16.4% in Bushenyi compared to 100% in Mbarara and 13.2% for the case of Rakai district. Government veterinary services delivery varied in that 59.7% were efficiently delivered while 40.2% were not efficiently delivered to the farmers. A total of 70.6% farmers agreed that Veterinary services faced some problems compared to 29.4% who disagreed.

A total of 5.95% of the farmers stated that traditional healers treat local chicken. About 36% of the farmers believed that the local herbs concoctions worked perfectly well. The common source of ash used as an ingredient in the medicinal mixture while treating any of the poultry diseases is from fire wood burnt from kitchen area. The wood may be from coffee plants, eucalyptus and any tree like cassia tree.

There was statistically significant relationship between the methods of choice for treating poultry diseases and the district locations (Bushenyi, Mbarara and Rakai) ($\chi 2 = 16.139, P= 0.000$); commercial feeding, ($\chi 2 = 13.965, P = 0.007$); commercial treatment ($\chi 2 = 16.471, P = 0.011$); prophylactic treatment of poultry diseases ($\chi 2 = 38.189, P = 0.058$) and Government veterinarians who treats poultry diseases ($\chi 2 = 19.305, P = 0.000$). However, there was statistically no significant relationship ($p>0.05$) between the methods of choice for treating common poultry diseases and occupation of the farmers ,gender ,the experience in poultry keeping , the management system of poultry keeping , the housing types for poultry , the water sources provision for poultry ,supplementation for poultry**),** commercial treatment for poultry**,** the prevention of vermin's that affect poultry**,** the traditional healers who treat poultry. The results of the multi nominal logistic regression analysis of the variables namely; district, feeding, vaccination, prophylaxis and government services provision were not significant.

Discussion

Eighty percent of the farmers were peasant farmers who keep small flocks of poultry for their livelihood. Most of the farmers had low educational levels and had varied experiences in poultry rearing varying from 6 months to over 5 years. The peasant farmers kept few numbers of commercial birds, turkeys and ducks. These results are consistent with National Agriculture Advisory Services (NAADS 2003; UBOS 2004; UBOS 2006; UBOS and MAAIF 2008 and UBOS 2009). The majority of the farmers were limited by small land sizes, low capital, low inputs and many were trapped in the vicious cycle of poverty and therefore could not expand (Tadelle and Ogle 2001; Kitalyi et al 2005). A few farmers had taken steps to commercial levels. There are Government policy initiatives aimed at addressing illiteracy levels and modernization of agriculture though Universal Primary Education (UPE), National agriculture Advisory Services (NAADS), prosperity for all programme (Bona bagagaware) and now recently the National Development Plan (UBOS 2009).

The farmers practiced free range (48.8%) compared to 30.5% and 11.6% engaged in semi-intensive and intensive management system of poultry rearing respectively. The management system adopted was dependent on the size of capital, land holding, capacity of the farmers to keep the poultry, and the availability of markets for the poultry products. The farmers were in transition to commercial farming (Jensen 1996; Tadelle 1996; Alders and Pym 2009 and Alders et al 2009).

It was noted that the free range system related closely with temporary housing adopted by the majority of the farmers, which was linked to source of water provision for birds. This agreed with findings by (Acamovic et al 2005). 'This study found that water was not provided adlibitum to indigenous poultry'.

The level of supplementation of the birds was dependent on the poultry type. The less cost effective sources e.g. greens, food left over's were more utilized for village chicken,

compared to commercially made feeds. The commercial poultry farmers used more commercial drugs than free range poultry farmers. This related to risk reduction and size of capital investment (Branckaert 1996).

The commercial farmers vaccinated and prophylactically treated their birds compared to subsistence poultry farmers. The subsistence farmers utilized the herbal drugs because of cost effectiveness of using them.

The different methods adopted by the farmers in vermin control was dependent on the scale of poultry kept, the financial capacity and the availability of appropriate technologies that were cost effective to the farmers.

Poultry diseases and their control

Newcastle disease (Kipumpura)

This disease is problematic to the farmers. The disease is caused by a virus. It spreads rapidly from bird to bird and is airborne; it may also be transmitted through body contact and contact with objects such as drinkers, feeders, feed, water etc. The disease attacks birds of all ages. Newcastle disease kills very many birds; it can kill up to 100% of the flock (Alders and Spradbrow 2001; Olivier 2004; Hodges 2009). The disease affects the respiratory, nervous and digestive system. The disease is common during rain season. Symptoms include body weakness, drooping wings, loss of appetite, gasping, coughing, sneezing, nasal and eye discharge and laying of thin shelled eggs. Greenish diarrhoea, wet vent, dirty feathers and drooling saliva are some of the other major signs. Signs of the nervous system are seen as convulsions, tremours, neck twisting and paralysis (Alders and Spradbrow 2001; Olivier 2004; Hodges 2009). The free range chicken farmers in the SWAEZ of Uganda commonly used *Capsicum annum (*Kamurari*)* together with ash and water to manage the Newcastle disease. However, Okitoi et al 2007 found that most poultry farmers in Western Kenya commonly use *Aloe vera* extracts to manage Newcastle disease. The farmers in the SWAEZ of Uganda believe that the use of *Capsicum annum (*Kamurari*)* with ash and water gives good results in Newcastle disease control. The addition of leaves of *Aloe vera* extracts as boosters to the concoctions improved the efficacy of the plant medicinal extracts.

Coccidiosis (Murangaro)

This was observed to be one of the common diseases disturbing farmer's birds. This disease is caused by a protozoan organism. It is transmitted from bird to bird through contamination of water, feed, droppings or litter. The disease usually occurs among chicks. Birds on free range management system rarely get this disease. The disease usually occurs where birds are kept inside a house all the time. It is common during the rain and dry seasons. The major clinical signs related to this disease include poor growth or low weight gain, loss of appetite; bloody diarrhoea, dropping wings and body weakness (Kakeocha 1984). The farmers in the SWAEZ use amarathus species, spinach (dodo) and water while others include use of *Cassia species* extracts for coccidiosis management.

Salmonellosis

This is another stubborn disease that disturbs farmer's birds. The disease is caused by a bacterium. Transmission is through feed, water and equipment contaminated with droppings.

Poor hygiene and keeping of birds inside poultry house encourage spread of the disease. It only occurs where there are attempts of housing during daytime. Symptoms include fever (shown by huddling), diarrhoea (chalky white, foamy and sticky), peculiar cheeps (weak shill cry of a young bird), loss of appetite and difficulty in breathing are the other signs (Jordan and Pattison 1996). The farmers used a combination *Capsicum annum* (Kamurari), ash and water to manage the disease. The farmers believe the concoctions works best.

Helminthosis/worms (Enjoka)

Caecal worm; these occur in the blind end of the caeca in infected poultry. They cause damage of caecum but can be treated with phenohiazine or piperazine (Kakeocha 1984). The farmers use *Nicotiana tabacum (*solanaceae*)* and *Erythrina abyssinica* plant extracts for management of helminthosis in the SWAEZ.

Gape worm

This is Red in colour and Y-shaped. It infests the bronchi, trachea and lungs. It causes pneumonia, gasping and suffocation especially in young birds. Thebensol is the treatment (Kakeocha 1984). The farmers in the SWAEZ of Uganda use *Erythrina abyssinica* (Ekiko), *Nicotiana tabacum* solution and salt solution.

Tape worm

Found in small intestine. Causes loss of appetite, loss of weight and diarrhea (Kakeocha 1984). The farmers in the SWAEZ of Uganda use *Erythrina abyssinica* (Ekiko), *Nicotiana tabacum* solution and salt solution. Other herbs used include *Cannabis sativa* (enjayi), *Clerodendrum rotundifolium* (Ekishekashekye), *Vernonia amygdalina* (omubirizi).

Infectious bronchitis (Ekihinzi)

Occurs bird to bird and by air. Respiratory troubles drop in egg production, eggs with abnormal shape and shells. Repeated vaccinations control the disease (Jordan and Pattison 1996). Farmers use S*olanum aculeastrum and Cannabis sativa* for managing the disease.

Mites (Oburooro)

Grey mites and feather mite: These are reddish/ dark brown spots on vent, tail and breast. Grey mites live on birds at all times. Mites attack feathers, suck blood (producing anaemia), loss of weight, pale comb and wattle (Kakeocha 1984). Farmers in the SWAEZ of Uganda use delnox tree leaves, sangula/ sorghum powder (sorghum bicolar mix).

Red mite

During the day these mites hide underside of perches, cracks, crevices etc. At night they attack the bird and suck blood. Farmers should try to prevent infestation of poultry houses with ectoparasites. Special consideration should be given to prevention of infestation to the nest during lay and incubation (Kakeocha 1984). The farmers use paraffin to manage the condition.

Fleas (Emikukuni)

This cluster on the comb, wattles and eyes. They cause irritation and may lead to blindness, loss of weight and death. Treatment is by chemicals and ethno botanicals (Jordan and Pattison 1996). The farmers use paraffin to manage the condition.

A number of diseases and pests affect the farmer's poultry; this study has been able to document the above listed diseases that directly and indirectly affect the farmer's birds. This agreed with research findings conducted by (Illango et al 2000).

The utilization of medicinal plants for poultry disease control

Preference of traditional medicine to commercial drugs is because the SWAEZ farmers believe that the local medicines are also effective, cost effective and are readily accessible. There is no eminent resistance and also they are quite useful in situations of no immediate recoveries post modern drug administration. In addition, no transport costs are incurred, it is easy to administer, there are no known dosages, there is minimal risk of drug overdose and when prompt treatment was administered then the birds were healed and the birds benefited from supplementation from vitamins.

The disadvantages experienced by the farmers following the use of medicinal plants include: the difficulty of getting plants during the dry season, delay in the recovery of the birds post herbal drug administration, difficulty in preservation of the herbal concoctions, ineffective concoctions unknown dosages therefore not standardized, may be harmful to persons preparing them, the tedious process of preparing herbal concoctions for many birds. Therefore you were not sure of the diseases you are treating because of poor diagnosis. The detailed medicinal concoctions used in the management of poultry diseases are detailed in table 4

Table 4. Health management and ethno veterinary management focus

No.	Health Problems	Ingredient/ Medicinal plant/ ITK	Preparation and method of administration	Quantity of remedy used	Level of confidence it will work
1	Newcastle disease (Kipumpura)	*C.annum* (Redpepper) + Ash+ Water	1 litre of water, add 8 seeds of Redpepper for 9 birds for 3 days	Concoction of 1 litre of water, 8 seeds of Redpepper and 1 table spoon of ash	High
		Red pepper + Ash+ water + *Aloe vera*	1 litre of water, add 8 seeds of Redpepper for 9 birds for 3 days. Add 1 leaf of *Aloe vera* leaf	Concoction of 1 litre of water, 8 seeds of Redpepper and 1 table spoon of ash. Add 1 leaf of *Aloe vera* leaf	High
		Aloe vera leaves	1 leaf of Aloe vera crushed and added in 1 litre of water and left in drinking water	1 leaf of *Aloe vera* crushed and added in 1 litre of water	Medium
		Ash and marijuana	Some tea spoonful + water+ leaves of Marijuana	Some 1 teaspoonful + 1 litre of water+ leaves of Marijuana	Medium
2	Coccidiosis (Murangaro)	Amaranthus (Spinach (dodo) + water	No standardized method of preparation	No standardized quantity used.	Medium
		Apply *Vernonia amygdalina* (Omululuza/	No standardized method of preparation	No standardized quantity used.	Medium

Table 4. Health management and ethno veterinary management focus

No.	Health Problems	Ingredient/ Medicinal plant/ ITK	Preparation and method of administration	Quantity of remedy used	Level of confidence it will work
		Omubirizi)			
		Omuruku (Cassia Sp)	No standardized method of preparation	No standardized quantity used.	Medium
3	Salmonellosis	Ash (Eijuryaka) Capsicum annum (Shenda)	No standardized method of preparation	No standardized quantity used.	Medium
		Ash (Eijuryaka) Shenda) + Kamurari (Redpepper)	No standardized method of preparation	No standardized quantity used.	High
4	Helminthosis/worms (Enjoka)	*Cannabis sativa* (Enjayi)+ Rukaka(*Aloe vera)*	No standardized method of preparation	No standardized quantity used.	High
		Erythrina abyssinica (Ekiko)	Root bark extracts are crushed mixed with water and used for helminthes treatment.	Varied concentrations and concoctions	High
		Nicotiana tabacum Tobacco leaves	No standardized method of preparation	No standardized quantity used.	Medium
5	Infectious bronchitis (Ekihinzi):	(*Aloe vera*) Ekigaji	No standardized method of preparation	No standardized quantity used.	High
		Capsicum annum (Esenda)	No standardized method of preparation	No standardized quantity used.	Medium
6	Mites (Oburooro)	Paraffin	No standardized method of preparation	No standardized quantity used.	Medium
	Fleas (Emikukuni)	Paraffin	No standardized method of preparation	No standardized quantity used.	Medium
7	Fowl pox	(Ash) + *Capsicum annum* (Esenda Ijunjaka Senda)	No standardized method of preparation	No standardized quantity used.	High

Veterinary services delivery

The study found out that Veterinarians treat the farmer's birds although there were limitations in the delivery of the Veterinary services. The common problems faced in accessing modern veterinary services include long distance to offices, lack of veterinary shops. Inadequate drugs which are usually expensive, lack of money to buy drugs, expensive veterinary services, late veterinary officers, veterinary officers not visiting farmers, inadequate feeds, few Veterinary officers (VOs) i.e. one veterinarian per sub county bringing up the issue of inadequate technical staff to deliver veterinary services to the farmers. Similar findings were noted by (Guéye 2009).

The study found that traditional healers (5.95%) played limited roles in treating local chicken. Many farmers collected, concocted and administered the local herbs by themselves. The farmers strongly believed that the local herbs when used timely led to recovery of the birds from the common diseases. This agreed with findings of (Balakrishman et al 2009*).*

Promoting use of ethno veterinary services in Uganda: The study documented the following: Proper handling and preparation of the medicinal plants in order to calculate the right dose. Preparation of herbal medicines in forms that can be easily administered. There was urgent need to improve on the quality of the herbs. There was urgent need to build the capacity of the

veterinarians in order to effectively extend knowledge to the stakeholders on ethno-veterinary utilization. There was need to conduct research in order to determine the efficacy of these medicinal plants and standardize the dosages. Sensitize the community on the use of the medicinal plants and encourage farmers to grow the medicinal plants for sustainable utilization.

There should be initiatives to train farmers on medicinal plants utilization and establish veterinary drug shops with ethno veterinary drugs. What ever capacity building initiatives were conducted to the farmers should be implemented and monitoring and evaluation programs put in place for sustainable utilization of the ethno veterinary products.

Conclusion and recommendations

- In this study, the majority of subsistence farmers reared poultry on free range for food security and household incomes. The farmers were limited by small land sizes, low capital base, low inputs and low capacity to implement large-scale farming. A wide range of herbal medicines were used in poultry health management. Although these herbal drugs were used in poultry disease management, there were information gaps related to efficacy, effectiveness, lethal doses and standardized doses and active ingredients of these plants. Therefore, this study recommends that further research on information gaps be identified and investigated.

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