



Medicinal plants used by farmers for treatment of major diseases of chicken in South Wollo Zone, Amhara region, Ethiopia

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Abstract

This study was carried out in selected districts of South Wollo Zone from October 2016 to May, 2017. Ethno-veterinary Medicine is the scientific study of the relationships between livestock and health problems. Therefore, the purpose of the study was to investigate the major health problems of chicken and to identify medicinal plants used by farmers in health management of chicken. Data were collected through structured questionnaire and through direct field survey to collect botanical data. From the total 200 respondents 60.5% of them kept their chicken under scavenging; 36.5% of them kept their chicken under semi-intensive and the rest 3% kept under intensive production systems. The most common disease problems mentioned by the respondents were New Castle Disease (NCD) (43.5%), Coccidiosis (30%), Ectoparasites (11%), Infectious Coryza (7.5%) and Fowl pox (3%). Around 20.5% of the respondents used modern medicines and 13% of them used traditional remedies to treat and control different disease problems. Twenty three medicinal plant species belonging to 17 families were collected and identified. The commonly used plant species were from Solanaceae, Rutaceae, Maliaceae and Allicaceae family. The main plant part used was leaves (45.8%). Most of the medicinal plants were applied through oral administration accounted for (82.6%), followed by fumigation (8.7%). Based on this study results it can be concluded that farmers in the study areas are using still traditional type of disease management practices for treating and controlling their chickens from different diseases. So, awareness creation and further scientific investigations should be carried out to ascertain the effectiveness of the identified medicinal plants used in chicken health problem management.

Keywords: Chicken, disease, ethno-veterinary practices, farmers, field survey, medicinal plants

Introduction

In Ethiopia, the agricultural sector is a corner stone of the economic and social life of the people. Employs 80-85percent of the population and contributes 40% to the total Gross Domestic Product (GDP). Livestock production, as one component of agriculture, covers 40 percent of agricultural output playing an important role in the national economy as it contributes 13-16% of the total GDP (Hunduma et al., 2010). Chicken

production plays an important role in the livelihoods of most citizens of rural communities of Ethiopia. In Ethiopia there are more than 56 million chickens which represent about 60% of the total chicken population in East Africa. Rural smallholder farmers under scavenging type of management conditions (traditional management system) raise more than 95% of the chicken population in Ethiopia (Tadelle et al., 2003). The remaining 5% are raised under intensive

management system. However, there is an increasing trend of development of the intensive systems especially in urban, sub-urban and peri-urban areas. Village chicken production in Ethiopia contributes with 90 and 92% of the national egg and poultry meat production, respectively (Tadelle et al., 2003).

The functions of chicken in a farm household include source of food, source of small cash income and social functions. Chicken have advantages over other species of livestock in that they need a smaller capital investment and space, had shorter generation interval and hence high turnover rate and have products with longer shelf-life. Furthermore, chicken have a socioeconomic significance in that the management of chicken and their products specially in the traditional system is mainly the responsibility of female and hence are important sources of cash for immediate needs of females for household issues. All these considerations make chicken an important component in food security and poverty alleviation programs of the country.

Despite all these merits, the sector is constrained by a number of factors which are common to all the other sectors. These constraints include poor feeding practices, low genetic potential of indigenous breeds, poultry diseases and insufficient knowledge about systemic attributes. A study noted that farm hygienic conditions, feeding, disease control and preventive measures were poor in the studied farms. Another study conducted to characterize the growth and feed utilization potentials of indigenous chicken reported that local chicken ecotypes in Ethiopia showed a growth rate that was by 49.4% less than Fayoumi chocks that are exotic breeds (Tadelle et al., 2003).

In Ethiopia, the contribution of village chickens to farm household and rural economies is not proportional to their high numbers. This is mainly due to low productivity levels and poor management systems. More than 98% of total meat and egg production comes from village poultry in Ethiopia (Udo et al., 2006). There are different constraints in village chicken production system. These include diseases, poor management, poor growth rates, predation and lack of organized markets from which the most important in the village chicken are diseases and poor housing conditions which expose birds for predation. Parasitic and other infectious diseases are common in the tropics where the standard of husbandry is poor and yet climatic conditions are favorable for the development of diseases. In addition,

predation is also involved in the mortality of chickens in the tropics (Tadesse, 2005).

Due to inadequate modern veterinary services in Ethiopia and its inaccessibility in most parts of the country, majority of the country's livestock owners mainly depend on traditional healers and herbalists. Traditional animal healthcare practices, also called ethno veterinary medicine, provide low cost alternatives in situation where western type drugs and veterinary services are not available or are too expensive (Galav et al., 2013).

Ethno veterinary medicine is frequently used for treating of livestock diseases by many different ethnic groups in Ethiopia. Nearly 90% of livestock population in the country use plant based traditional medicines as their major health care system (Endashaw, 2007). Ethno veterinary medicine plays an important role in animal production and livelihood development. It provides valuable alternatives to and complements western-style veterinary medicine (Shen et al., 2010).

In the current study area there is no information documented about the ethno veterinary activities (use of medicinal plants). Even though it is known that, the zone has plant resources and hence, the associated traditional knowledge resource is expected to be significant. Thus, this Medicinal plants survey plays a vital role to draw information on plants and related indigenous knowledge for conservation and sustainable utilization. Having an introduction of this way; the general objective of this study was to collect, identify and document the ethno-veterinary medicinal plants in veterinary medicine available in South Wollo Zone, which suppose that the data could be used as a source for further studies on medicinal plants for further pharmacological and phytochemical studies with the following specific objectives of overviewing the base line information on major constraints and health management of the chicken production system in the study area; identifying major constraints and infectious diseases affecting chicken production and collecting, recording, identifying and documenting medicinal plants used by farmers for their chicken health management.

Materials and Methods

Study area:

The study was conducted from October 2016 to May 2017 in Kewet, Lalo-mama midir, Mafu-mezezo/ Kalu/ districts of South Wollo Administrative Zone Of Amhara National regional State in Northeastern part of Ethiopia South Wollo to identify and document medicinal plants used by farmers for treatment, control and prevention of backyard chicken health problems. South wollo Zone is one of the 11 zones of the

Amhara region. Dessie is the capital city of the zone which is located 4001 km from Addis Ababa. The area is highland and mountainous in most parts of the zone farmers follow extensive mixed farming system rearing of different livestock species. The Zone has a total human population of 1,248,698 males and 1,270,164 females in the area of 17,067,45square kilometer. The total population of chicken in the study area is 1,591,209 South Wollo Zone Livestock and Fishery Resources Development Office (SWZA-LFRDO, 2017) (Fig. 1).



Figure: Map of Amhara region & its 11 zones

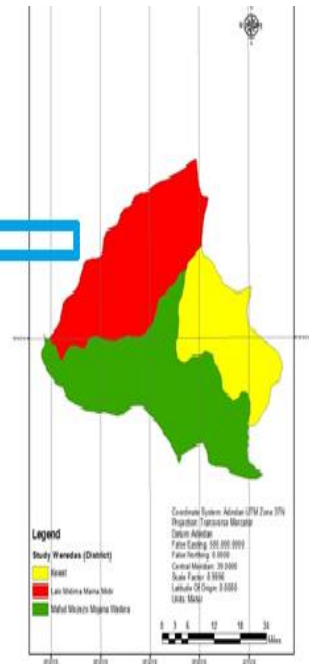


Figure : Study districts

Fig. 1: Map of Amhara region, zones and study districts

Study population:

The population for this study was farmers keeping chicken in different production system and medicinal plants found in the study area.

Sample size determination and sampling procedure:

The districts were selected randomly from a total of 21 districts of South Wollo Zone. The selected Districts were Kewet, Tewledere, Lalo-medima, Mafu-mezezo and Kalu. Then, jointly with development agents working in the selected districts and using purposive sampling technique was employed to select and interview 200 farmers at the market area during the market day and also at veterinary clinics.

Prior to field survey secondary data were taken from the South Wollo Zone office of Agriculture on overall agricultural production, to select study districts and experts of animal husbandry consulted. Based on this information, the zone where the study conducted was divided into 8 strata based on their recent administrative districts, of these, three districts and two PAs from each district was purposefully selected as these communities highly depend on traditional healings and possess many skills acquired from fore-parents. Besides considering their wide use of traditional ethno-veterinary products that meet our purpose, the study was limited to these districts to increase feasibility of the study. The selected area typically possess an intellectual healers and covered by different plant species that used for traditional medicinal to treat different backyard chicken health problems.

Selection of informants were performed according to the conformation of (Martin,1995) and (KebuBalemie et al., 2004), they stated that when recording indigenous knowledge controlled by ethno botanical healers or by certain social groups the choice of key informant is vital for our cases, representative informants and knowledgeable traditional medicine practitioners of the districts was selected using systematic random and purposive sampling approaches with the help of local administrators and local people from the three districts, who are considered to be key informants. Information regarding the depth of traditional knowledge of each practitioner was first gathered from the local people by the help of focus group discussion per each kebele with an average number of 5 participants. The same information was collected from the local administrators of each kebele. The information obtained from the local people and the administrators was then crosschecked and mostly similar responses from the two groups used to identify knowledgeable practitioners. The selected individuals were well known in the community due to their long practice in providing services related to veterinary medicinal plants.

During data collection and preliminary discussion were individually held with the key informants through assistance of local elders to elaborate the objective of the study.

Ethno botanical data collection, identification and description:

Global Positioning System (GPS) apparatus was used to record location of the three selected districts (figure 1).Semi-structured interviews, focus group discussions, participant observation and walk-in-the-roads were used to collect ethno veterinary data as described by (Martin, 1995). Informants were interviewed individually in the local Amharic language followed by independent walk in the roads activities, which give an opportunity for more discussion and the practical identification of traditionally used medicinal plants in their natural environment. During interview, data regarding different categories of socio-demographic characters' such as name, age groups, gender, level of education and healing experience of each informant.

Information regarding to specimens of plants that were used by the healers for their poultry ailments treatment will be collected using the standard botanical methods, that include the vegetative part, leaves, and floral, fruits and others (Wabe et al., 2011).

Indigenous knowledge (IK) on medicinal herbs, shrubs, trees and climbers which was used for poultry health management was documented after interviews, observations and group discussions with herbalists, farmers and other stake holders. However, the rich indigenous knowledge on many of the traditional plant remedies is subjected to loss as it has mainly been passed orally for generations without being properly or scientifically documented (Lulekal *et al.*, 2008).

However, the effort is still quite insignificant when compared to the undocumented global and national ethno veterinary plant wisdom. In this regard, there has been no work conducted in South Wollo Zone of Amhara Regional State to investigate and document the apparent wealth of indigenous knowledge on utilization, management and conservation of medicinal plants.

Data analysis:

The collected household data were summarized and analyzed using the Statistical Package for Social Scientists (SPSS version 20.0) software and the data that was collected by using GPS was analyzed by using Arc view Geographic information system (GIS version10.0) .

Descriptive statistics and the Proportions (percentiles), figures and tables were used to summarize the collected ethno-veterinary medicinal data.

Results

Gender and level of education of the respondents

From a total 200 respondents 65.5% were male and 33.5 % were female. Among, these 58.5%, 37.5% and

4% of them were old, adults and young respectively. Majority of respondents in the study area were able to write and read (34.5%) followed by illiterate (29%), secondary school (17.5%) and other like religion education (7%) (Table1).

Table 1: Demographic characteristics of the respondents

Variables	No of respondents	Percent (%)
Sex		
Male	133	65.5
Female	67	33.5
Age		
Young	8	4
Adult	75	37.5
Old	117	58.5
Educational status		
Illiterate	58	29
Writing & reading	69	34.5
Primary	24	12
Secondary	35	17.5
Other	14	34.5

Types of chicken production systems

In this study, (60%) of the respondents kept chicken under scavenging system with supplementation where

chickens move freely in the surrounding environment while (37%) and (3%) respondents kept their chicken under semi intensive and intensively respectively (Fig. 2).

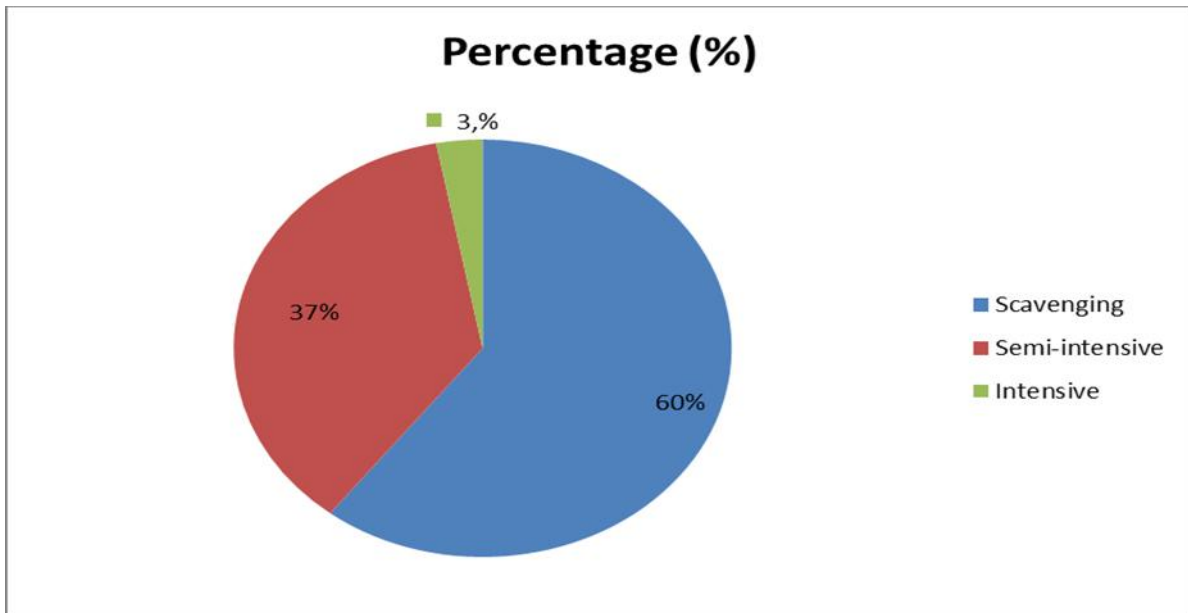


Fig.2: Management system practiced in the study area as mentioned by the respondents

Major chicken diseases and their management methods

Among the different constraints of chicken production diseases were the main production constraints (34.5%)

followed by lack of effective veterinary treatment (31.5%), predator (20%), ectoparasites (10%) and short of feed & poor management (4%) (Table 2).

Table 2: Poultry production constraints in the studied area mentioned by respondents

Constraints	No of respondents	Percent (%)
Diseases	69	34.5
Predator	40	20
Ectoparasites	20	10
Lack of feed And low management	8	4
Lack of effective treatment & vaccination	63	31.5

Diseases were also the main causes of mortality (51.5%) followed by predator (32.5%), diseases and

predator (10%), external parasites (7%), low management (45%) and others (4%) (Table 3).

Table 3: Major causes of chicken mortality listed by respondents

Types of causes	No of respondents	Percent (%)
Diseases	103	51.5
Predator	47	23.5
Low management	8	4
Diseases and predator	20	10
External parasites	14	7
Other(rain, flood)	8	4

Majority of respondents sell their chicken during diseases out break (34%) while 20.5% of the use modern veterinary medicine, 16% of them do not

intervene, 13.5% of them use ethno veterinary medicine , 7% of them use human medicine, 4.5% of them use vaccination and others (4.5%) (Table 4).

Table 4: Measures taken by farmers during diseases out break

Interventions taken farmers	No of respondents	Percent (%)
Veterinary treatment	41	20.5
Vaccination	9	4.5
Selling	68	34
Do not intervene	32	16
Ethno veterinary treatment	27	13.5
Human drugs	14	7
Others(home food)	9	4.5

Most of respondents complained that Newcastle diseases was the most common disease (43.5%),

followed by coccidiosis (30%), ectoparasites (11%), fowl pox (3%), and others (5%) (Table 5).

Table 5: Prevalence of diseases listed by respondents

Prevalent diseases types	No of respondents	Percent (%)
Newcastle diseases	87	43.5
Coccidiosis	60	30
Ectoparasites	22	11
Infectious coryza	15	7.5
Fowl pox	6	3
others	10	5

Majority of respondents acquire knowledge of ethno veterinary medicine from their parents (58%) while were from their friends (25%) and others from

migration, religion by reading different books, newspaper (17%) (Table 6).

Table 6: Acquiring knowledge of ethno veterinary medicine

Source of knowledge	No of respondents	Percent (%)
Family	116	58
Friends	50	25
Others(religion, travelling,)	34	17

Most of respondent's choice modern treatment (58%) for their poultry during diseases outbreak, followed by

ethno veterinary treatment (29%) and both veterinary and modern treatment (13%) (Table 7).

Table 7: Treatment choice of respondents to treat their poultry

Treatment choices	No of respondents	Percent (%)
Ethno veterinary medicine	58	29
Modern medicine	116	58
Both of them	26	13

Most of informants confirmed that most of herbal medicaments used were administered orally (82.6%)

followed by fumigation (smoke) (8.7%), topical application (4.3%) and spraying (4.3%) (Table 8).

Table 8: Method of application of herbal medicine listed by respondents

Routes of applications	No of respondents	Percent (%)
Oral	19	82.6
Topical	1	4.3
Fumigation	2	8.7
Spraying	1	4.3

Fig. 3 shows us as majority of informants use the leaf portion of plant for preparation of remedy (45.8%) followed by whole part (16.7 %), seed (4.2%), fruit

(8.3%), bulb (8.3%), none (12.5%) and also from root part of plant (4.2%).

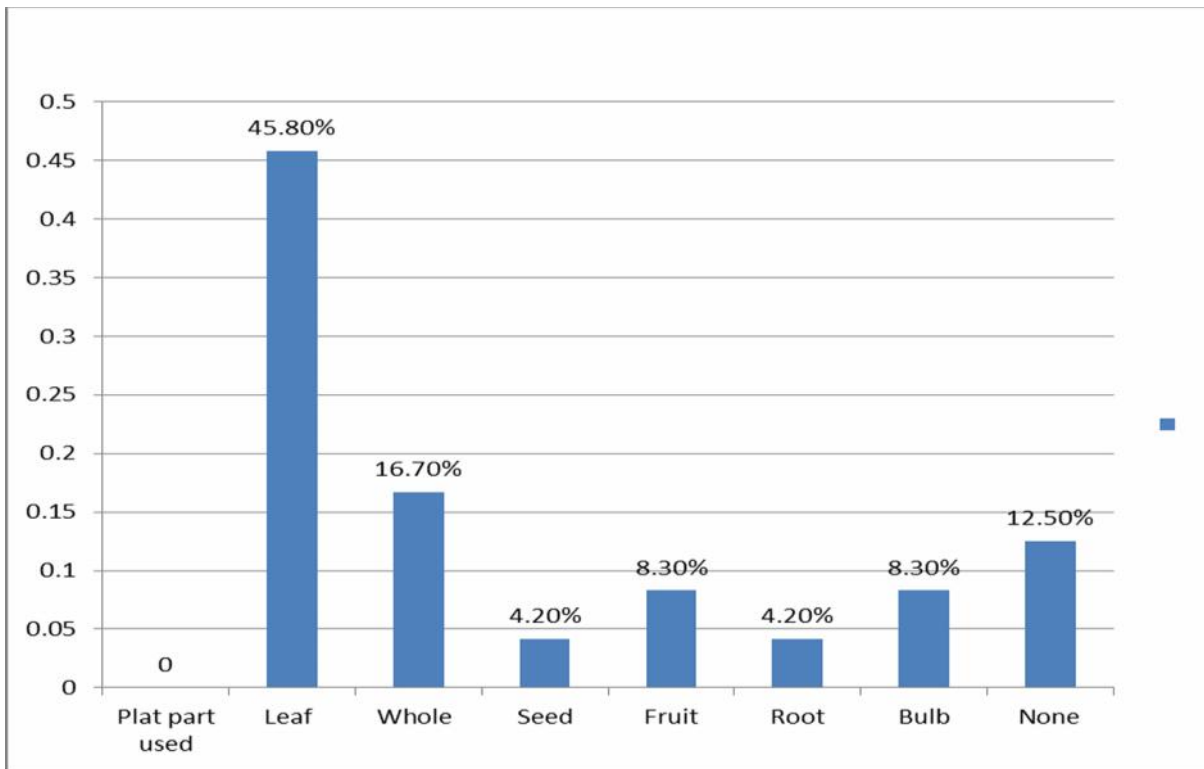


Fig.3: Parts of plant used for treating poultry ailments

The investigation reported a total 17 plant families and 23 plant species (Table 9), different parts of which are used in different purposes in poultry management by the farmers besides normal medicines and vaccines.

Few plants are used to maintain the farm hygiene, which is very much essential for optimum growth and less mortality.

Table 9: Lists of plants used for treatment, control and prevention of poultry diseases listed by respondents in the studied area

No	Species name	Family name	Local name	Disease condition	Parts used	Preparation
1	<i>Datura stramonium</i>	Solanaceae	Bang	Depression, diarrhea	leaf	Crushing leaves of and add with injera
2	<i>Nicotina tebacum</i>		Timbaho	depression	leaf	Place leaves in fire
3	<i>Capisicum annuum</i>		Karia	Diarrhea, ectoparasite	seed	Crushing seeds and mix with injera
4	<i>Azadirachta indica</i>	Maliaceae	Neem	Coccidiosis	leaf	Boiling of leaf and fruit
5	<i>Schinus molle</i>	Anacardiaceae	Kundoberbe	Bloody diarrhea & Ectoparasite	Leaf and fruit	Boiling the leaves and spray
6	<i>Lepidiumstavium</i>	Brassicaceae	Feto		seed	Grinding the seeds of and mixing with butter
7	<i>Aloe vera</i>	Aloceae	Ret	Newcastle (Fengile), coccodios (kofis)	Whole part	Squeezing and collecting juice, flower and mixing with salt
8	<i>Croton mscrostachyus</i>	Euphorabiaceae	Bisana	Open wound	leaf	Collecting juice extract and apply locally
9	<i>Allium astavium</i>	Allicaceae	Nechsahinkurt	Bloody diarrhea	bulb	Crushing it and mix with katical
10	<i>Allium cepalini</i>		Key shinkurt	Diseases prevention	bulb	Crushing bulb
11	<i>Verinonia amygdalin del</i>	Astraceae	Girawa	Watery diarrhea	leaf	Crushing leaves and mix with injera
12	<i>Rutachalepensis</i>	Rutaceae	Tena-adam	Swelling of head	Whole	crushing it add mixing with injera
13	<i>Citrus sinesis</i>		Birtukan	Disease prevention and control	fruit	Squeezing and collecting juice
14	<i>Citrus ourantifolia</i>		lomi	Diarrhea and ectoparasite	fruit	Sequezing and collecting juice
15	<i>Caricaceae papaya</i>	Celactraceae	Papaya	Watery diarrhea	seed	Grinding seeds and mix with its fruit
16	<i>Catha edulis</i>		chat	Diseases prevention	leaf	Crushing leaves and mix with salt
17	<i>Oleaeuropaea capenesis</i>	Oleaceae	Woirra	Depression	leaf	Fire leaves and fumigate the house of chicken
18	<i>Phytolaccadodecandra</i>	Phytolaccaceae	Endod	diarrhea	Whole	Crushing the leaf and mix with salt
19	<i>Zingibarofficinale</i>	Zingibiberaceae	Zingible	Newcastle diseases (fengile)	rhizome	Crushing the rizome
20	<i>Moringa stenopetalia</i>	Moringaceae	Shiferaw	Diseases prevention	leaf	Crushing leaves and mix with katicala
21	<i>Rhamnusprinoides</i>	Rhamnaceae	Giesho	depression	Leaf	Crushing seeds
22	<i>Zehneriascabra</i>	Cucurbitaceae	Aregresa	Swelling of head	leaf	Crushing leaves
23	<i>Brassica carinata</i>	Brassicaceae	Gomenzer	depression	seed	Grinding seeds and mix with salt

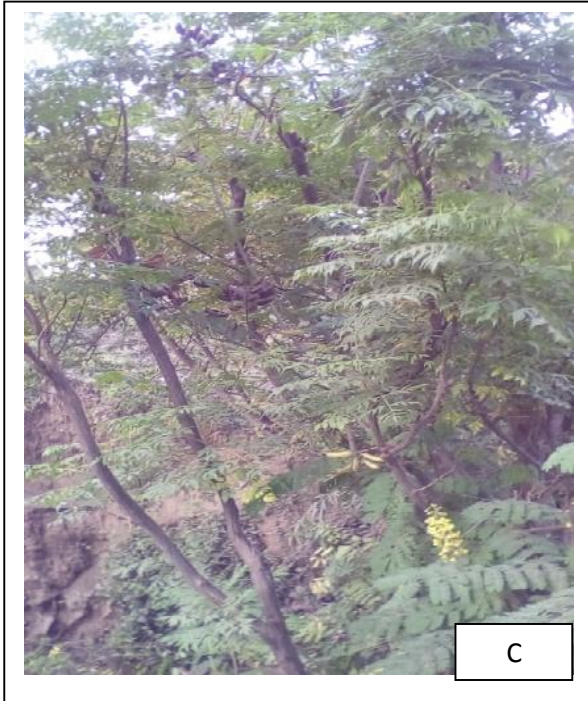


Schinus molle



Moringa stenopetalia

Fig 4: Photos of *Schinus molle* (A) and *Moringa stenopetalia* (B) that were collected



Azadirachita indica



Caricaceae papaya

Fig 5: Photos of *Azadirachita indica* (C) and *Caricaceae papaya* (D) that were collected

Discussion

The current study was carried out in three selected (Kewet, Lalo-mama midir and Mafu-mezeza) of South Wollo Zone in Northeastern part of Ethiopia. Majority of the respondents were male followed by female and most of them were old and small number of them were young and able to write and read. Many medicinal plant knowledge and practice was documented from the current study area. Similar results were observed in different part of Ethiopia (Teklehaymanot and Giday, 2007; Giday, et al., 2009). This may indicate that the indigenous medicinal plant use knowledge was declining among the younger generation. This may due to the influence of modernizations. But this result disagrees with the finding of (Bekalo et al., 2009) with majority of informants interviewed were young's'.

In this study, (60.5%) of the chickens were found to be managed under scavenging system with supplementation where chickens move freely in the surrounding environment while (36.5%) and (3%) were managed under semi intensive and intensively respectively. This finding was agreed with (Zemelake et al., 2016) from Ethiopia which results scavenging system was the most used type of production.

Diarrhea (49.5%) was the most prevalent clinical sign followed by torticollis (16.5%), coughing and sneezing (11.5%), lesion on comb (9%), feather pickling (6.5%) and others like lesion on leg (1.5%). It could be due to diarrhea is common manifestation of most diseases.

Most of respondents complained that Newcastle diseases (43.5%) was the most common diseases, followed by coccidiosis (30%), ectoparasites (11%), others (5%) and fowl pox (3%). The current finding was in agreement with (Moreki, 2013) which results the major poultry diseases in Botswana were Newcastle diseases, coccidiosis, fowl pox and ectoparasite.

Majority of respondents acquire knowledge of ethno-veterinary medicine from their parents while were from their friends and others from migration, religion by reading different books, newspaper. This finding was consistent with (Melesse et al., 2015) kampata, Ethiopia. Healers transfer traditional medicinal knowledge to the family members whom they think keep the secrecy.

Modern treatment (58%) was the most widely used type of treatment during diseases outbreak, followed by veterinary treatment (29%) and both veterinary and modern treatment (13%). The present was in agreement with (Gabanakgosi et al., 2012) from Botswana Sixty-five percent of used modern medicines, 10% traditional remedies while 25% used both modern medicines and traditional remedies.

The total 23 medicinal plants collected from the study area, most of them were herbs followed by shrubs, trees and climbers. This finding agree with the previous finding of (Hilemariam *et al.*, 2009; Megersa *et al.*, 2013; Belayneh and Bussa, 2014) The use of herbaceous medicines seems valuable since they can replace themselves easily, and they are easily accessible ubiquitously given a reasonable climatic condition.

Majority of informants confirm that most of remedies were prepared from fresh plants (78.3%) and dry plant (13%) followed by both dry and fresh. This finding was consistent with previous finding (Lulekal et al., 2013; Melese et al., 2015) which had the largest proportion (71%) of the remedy is processed in a fresh form, which is consistent with earlier reports. Many healers believed that fresh preparations are effective in healing the supposed ailment.

Medicinal parts of plants present in different parts of the plant like root, stem, bark, leaf, flower, fruit or plant exudates in this study leaf was dominant part of plant used for preparation of remedy (45.8%) leaf (17.4%), seed (4.2%), fruit (8.3%) ,bulb (8.3%), root (4.2%) and also from whole part of plant (4.3%). This result was agreed with the previous study of (Giday et al., 2010) from Ethiopia. The preference of leaves to other plant parts seems may not cause a plant death and also for the presence of more bioactive ingredients.

Most of informants complained that oral route was the principal means of administration of medicine. This study was in agreement with (Giday et al., 2007; Giday et al., 2009). The oral route of remedial administration was the highest, which is in accord with others.

Most informants confirmed that most of preparations were in the form of crushing and grinding (73.9%) followed by collecting juice(13%), fumigate (8.7%) and boiling(4.3%). The current finding was in agreement with the previous finding (Shimels, et al.,

2017) from Ethiopia which results most of herbal medicaments were prepared by crushing.

Out of 23 about (60.9%) of plant were obtained from cultivated land area and (17.4%) were from wild area and 21.7% species were from both cultivated and wild area. The current finding disagrees with the previous result of (Getaneh and Girma, 2014; Alemayehu et al., 2015). This could be due to the majority of plants used for medical importance were cultivated by traditional healers on home garden.

Majority of respondents use medicinal plants without adding any ingredients to the plant (30.4%) followed by salt (26.1%), water (17.1%), bread and engera (8.7%) and also butter (8.7%). Most of remedies were prepared by mixing different remedies. This finding was in agreement with (Van der Merwe et al., 2001) from South Africa which results the majority of ethno veterinary medicines (64%) were used single ingredients, alone or with a vehicle for administration. Informants who used mixtures of active components stated that it made their medicines more potent. And this is due to the fact that clinical symptoms of many poultry diseases were so closely related that sometimes it was difficult to distinguish between specific diseases. This broad-spectrum approach was similar to the current conventional medicine approach with broad-spectrum antibiotic.

Aloe species was most widely used remedies for treating coccidiociss (Kofis) this result was consistent with the previous study (Mwale et al., 2005) in Zimbabwe reported the use of Aloe species in the control and treatment of coccidiosis.

Conclusion

In the study area the main chicken production systems are scavenging system and semi-intensive system. The major diseases of chicken experienced by respondents were New Castle Disease, coccidiosis, ectoparasites and infectious coryza. Most of the respondents use modern veterinary medicine and traditional medicine practices. But the use of modern medicines was predominant compared to traditional remedies. The high usage of modern medicines could be attributed to the free supply of vaccines to the beneficiaries by the south wollo zone livestock and fishery resources development office. Among the many identified medicinal plant families Solanaceae, Rutaceae and Maliaceae more frequently used by farmers to treat different health problems of chicken. This revealed

ethno veterinary medicine, which involves the use of medicinal plants is supporting the people of South Wollo Zone in chicken health management. Most of medicinal plant remedies were prepared from herbs and applied through oral route. However, due to deforestation these medicinal plants facing risk of disappearing. So, based on this conclusion awareness creation to farmers should be demonstrated on the advantages of cultivating indigenous plants and their conservation; in addition to this since next to modern veterinary medicine traditional medicine was widely used by farmers thus in the region large scale and detailed studies should be carried out to that would help to develop and formulate sustainable disease prevention and control strategies through integration of conventional animal treatment with traditional treatment of scavenging chicken in particular and animals in general.

Further scientific investigations should also be carried out to ascertain the effectiveness of the identified medicinal plants used in animal health problem management.

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