

Ethnobotanical Knowledge of Pastoral Community for Treating Livestock Diseases in Shinle Zone, Somali Regional State, Eastern Ethiopia

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Abstract: Modern livestock health care is still at its lowest stage in Ethiopia and most modern veterinary services like drugs and veterinary professionals are not accessible and affordable to the majority of pastoral farmers. As a result, they are heavily relying on their traditional knowledge and practices on locally available materials mainly plants in the management of animal diseases. However, this traditional knowledge has not yet been well documented and analyzed. Therefore, this study was carried to identify medicinal plants used as ethno-veterinary to manage animal diseases and examined factors that threatens ethno-veterinary in Pastoral Community of Shinle Districts. Survey was conducted to gather information from 180 households on indigenous knowledge using a semi-structured questionnaire and field guided observations. A total of thirty-one plant species belonging to eighteen families used against fourteen types of livestock health problems were collected and identified. Majority of plant species fall under Fabaceae (22.5%) and Euphorbiaceae (16.1%) family that are largely shrubs. The most commonly used plant parts were roots (35.5%) followed by leaves (25.8%). Remedy preparation was mainly through chop and soak in concoction of water and salt. Oral, topical and nasal route were the common mode of administration with no standardized dosing and treatment duration. The principal threats of medicinal plants were invasive plants, drought, over grazing, agricultural activity and firewood collection. Endogenous knowledge on ethno-veterinary medicinal plants was accepted orally from healer's forefathers and transmitted similarly. Identified medicinal plants were not on sale in the local markets. Awareness should raise and ethno-veterinary medicine should integrate in to livestock extension delivery systems for the need to exploit the possibility of discovering more medicinally viable plants. Further studies needed under controlled conditions on the efficacy and veterinary properties of such plant products and livestock disease treatments.

Key words: Ethno-Veterinary • Livestock • Medicinal Plants • Pastoralists • Plant Species

INTRODUCTION

Medicinal plants traditionally used in the treatment of animal diseases play a crucial role in local health modalities [1]. The use of ethno-veterinary medicine (EVM) may present a cheaper and sustainable alternative to synthetic medicines in the present and future [2]. These herbal preparations, drawing upon centuries of traditional belief and use, are in practice over time by pastoralists and farmers for the treatment of different diseases of livestock [3]. About 65-80% of the world's population in

developing countries depends on plants for their primary healthcare due to poverty and lack of access to modern medicine [4]. Likewise 80% of the total population of Ethiopia is depending on traditional medicine to treat different types of human illness and animals [5]. According to the United Nations Food and Agricultural Organization, lack of drugs to treat diseases and infections results in losses of 30–35% in the breeding sector of many developing countries, where poor animal health remains the major constraint to increased production [6].

Modern livestock health care in pastoral community of Ethiopia is still at its lowest stage due to limited veterinary services and supply of drugs. Besides, most modern drugs are expensive and, as a result, not affordable by the majority of Ethiopian farmers and pastoralists. As a result, pastoral and agro-pastoral communities heavily rely on their traditional knowledge and practices on locally available materials mainly plants in the management of animal diseases. However, this traditional knowledge has not yet been well documented and so far very little of the ethno-veterinary knowledge in Ethiopia is properly documented and analyzed [7]. Moreover, the knowledge of ethno-veterinary transmitted from generation to generation mainly orally; consequently, it remains fragile and threatened and presents an urgent need for being record and document for prospect utilization. Therefore, this study was identified medicinal plants used as ethno-veterinary to treat animal diseases in pastoral community of Shinle zone and examined factors that threatens ethno-veterinary in the study area.

MATERIALS AND METHODS

Description of the Study Area: This study conducted in Ethiopian Somaliland regional state, Shinle zone. It is located at about 517 Km east of Addis Ababa and 15 Km from Dire-Dawa. The area's altitude ranges between 950-1300 meters above sea level. Annual average rainfall and the average temperature of the area are between 500-700mm and 27.5°C, respectively [8]. About 85-95% of Shinle district population depends on livestock and livestock products for their livelihood and the rest, 5-15% are engaged in the mixture of crop-livestock production and cross border trade. The pastoralists keep the full range of livestock in total livestock unit (TLU): 90000 sheep, 55000 cattle, 100000 goats and 60000 camels [9].

Sampling Methods: Among the pastoral area of Somali Regional State, Shinile, Erer and Dembel districts was purposively selected on the bases of their traditional knowledge to treat their diseased livestock's. One hundred eighty households (Sixty from each district) who used and practiced providing services related to veterinary medicinal plants purposively selected and interviewed conforming to [10].

Data Collection: Survey conducted to gather information from pastoral communities on traditional usage of plants in livestock health care system using a semi-structured

interview, observations and field guided walks with traditional healers to share their indigenous knowledge. Data collected from respondents on local name of medicinal plant, diseases treated, animal species treated, distance from the house to place where plant species gathered, seasonality of plant species, degree of management (wild/cultivated), abundance, parts used, condition of plant part used (fresh/dried), other ingredients or additives, methods of medicine preparation, preservation, dosage prescriptions, routes of remedy administration, noticeable adverse effects of remedies, use of antidote for adverse effects, source and method of indigenous knowledge transfer, existing threats and traditional conservation practices, marketability of medicinal plant species and income earned per animal treated for any disease.

Plant Identification: Specimens of plants with leaves and roots and including floral parts, as it was appropriate for taxonomic identification were collected. The specimens coded by their vernacular names and transported by plastic bag to Haramaya University where it identified and authenticated.

Statistical Analysis: The collected data analyzed using statistical package for social sciences (SPSS) version 16. The variability of documented knowledge of ethno-veterinary medicine and the homogeneity of the information given by the respondents were estimated by informant consensus factor (ICF) [11, 12].

$$ICF = \frac{nur - nt}{nur - 1}$$

where: nur = Number of usage-reported by informant, nt = Number of plant species used.

RESULTS AND DISCUSSION

Respondents' Demographic Characteristics: The majority of respondents were males (Table 1) and this marked difference reflects the limited involvement of women in livestock production and herd health in study sites. Similarly, [13] observed that men had more knowledge of plant usage because they naturally selected during childhood to be trainees of ethno-veterinary practices. In addition, in some regions, labor division makes women responsible for housekeeping only, while men take care of the animals [14]. The age characteristics indicated that most of respondents were elder (Table 1) and the concern expressed by some elder informants that

Table 1: Demographic characteristics of respondents in the study Area (N=180)

Variables	Shinile		Erer		Dembel		Total	
	Portion	%	Portion	%	Portion	%	Portion	%
Age								
< 40	13	7.2	11	6.1	15	8.3	39	21.7
40-50	29	16.1	27	15	25	13.9	81	45
>55	18	10	22	12.2	20	11.1	60	33.3
Gender								
Male	51	28.3	48	26.7	54	30	153	85
Female	9	5	12	6.7	6	3.3	27	15
Educational status								
Primary school	19	10.5	22	12.2	16	8.9	57	31.7
Illiterate	41	22.8	38	21.1	44	24.4	123	68.3

Table 2: Plant families identified in the study area

Families	Number of species	%
<i>Berberidaceae</i>	1	3.2
<i>Rubiaceae</i>	1	3.2
<i>Meliaceae</i>	2	6.4
<i>Fabaceae</i>	7	22.6
<i>Euphorbiaceae</i>	5	16.1
<i>Liliaceae</i>	1	3.2
<i>Oleaceae</i>	1	3.2
<i>Aloaceae</i>	2	6.4
<i>Myrtaceae</i>	1	3.2
<i>Polygonaceae</i>	1	3.2
<i>Solanaceae</i>	2	9.7
<i>Asteraceae</i>	1	3.2
<i>Lythraceae</i>	1	3.2
<i>Lamiaceae</i>	1	3.2
<i>Balantaceae</i>	1	3.2
<i>Cyperaceae</i>	1	3.2
<i>Zingiberaceae</i>	1	3.2
<i>Rutaceae</i>	1	3.2

Table 3: Livestock diseases treated by medicinal plants in the study area

Types of Diseases	Local name	Plant species (N)	%	Informant cited (N)	%	ICF
CCPP/ Cough	Qufac iyo lab wareen	3	9.7	29	24.2	0.93
Diarrhea	Shuban	7	22.6	17	14.2	0.62
Wound healing	Boog	3	9.6	27	45.0	0.93
Ectoparasites (ticks)		1	3.2	37	30.8	1.00
Bloating		2	6.4	22	18.3	0.95
Evil eye	Shaydaan	1	3.2	9	7.5	1.00
Body swell	Jidh barar	3	9.7	15	12.5	0.86
Kidney problems (like Bloody Urine)	Infekshinka kaadi mareenka	2	6.4	19	15.8	0.94
Eye problems	Gaaska caloosha	1	3.2	21	17.5	1.00
Hayna bite		1	3.2	15	12.5	1.00
Skin diseases like lesions/ dermatophilosis	Xanuunka maqaarka	1	3.2	43	35.8	1.00
Snake bite		2	6.4	7	5.8	0.83
Internal parasite/like tape worm		2	6.4	39	32.5	0.97
Rabies (mad dog bite)		2	6.4	43	35.8	0.97

N.B: CCPP = Contagious carpine pleuropneumonia

young people were not interested in ethno-veterinary medicine (EVM). The young generation had little knowledge about the traditional medicines while the elder people know much more about the traditional knowledge to treat livestock ailments. This finding is in line with the study of [15] who reported that majority of the respondents who involved in traditional livestock treatment were old age people.

Medicinal Plants and its Application to Livestock Diseases: Thirty-one plant species used against fourteen (14) types of livestock diseases that have uncomplicated symptoms and those plants were botanically distributed across 18 families (Table 2). This study suggested that the highest number of plant species found in *Fabaceae* family followed by *Euphorbiaceae*. With the agreement to current finding, the dominant use of *Cucurbitaceae*, *Euphorbiaceae*, *Fabaceae* and *Solanaceae* families have been noticed by [16] to be used for treatment of cattle diseases in other part of the country. Such widespread use of these plants by different groups of societies in different countries could be to a certain extent attributed to their efficacy. In other words, the ethno medicinal reports of those species from wider geographical regions and different cultural groups could validate the medicinal properties of these species.

Diarrhea was the one against which a high number of medicinal plants species were prescribed (Table 3). These disease conditions reported in current study comparable to those reported by Gabriel [17] whose study indicated many similar diseases such as Worms (external parasites), diarrhea, eye infection, Cough, Bloat, Wounds and Ectoparasites. Similarly, Nalule, Karue and Katunguka-Rwakishaya [18] reported diseases or conditions like bloat, trypanosomiasis, skin diseases, CBPP, FMD. Elsewhere, trypanosomiasis, diarrhea, bloat, helminthosis, snakebites and wounds were the common diseases reported by Adeola, Adewole and Olofintoye [19]. Among the factors which made the people of the study area to rely on indigenous knowledge associated with wild plants to treat livestock disease is inaccessibility of veterinary clinics and veterinarian to community lives in marginal areas and the conventional drugs are also unaffordable to the less economically endowed people. This finding also supported by [20] who reported that people recognizing the value of indigenous knowledge to solve their animal health problems in an accessible way and economic affordability. The inconsistency and sometimes-complete

absence of conventional veterinary services by the government and private sector has led the pastoralists to stick and rely on the traditional treatment systems followed by their ancestors [21].

Sources and Growth Habit of Medicinal Plants: Analysis of the growth forms of ethno-veterinary medicinal plants in the study area revealed that shrubs constituted the largest number or proportion with 12 species whereas herbs and trees account 11 species and 8 species, respectively (Table 6). Dominance of shrubs was also reported by earlier ethno-botanical inventories [22-25]. In contrast, other investigators [26-29] reported dominance of herbaceous species for ethno-medicinal preparation in elsewhere. Also, Yibrah [30] reported that trees and herbaceous medicinal plants were the widely used for the treatment of various ailments that constituting 51.72% and 24.14%, respectively, followed by 13.79% shrub and 10.34% climbers. However, the variation in dominance of growth forms of medicinal plants used among different traditional healers in the country attributed to the wide agro-ecological diversity and specific indigenous knowledge of different communities. All respondents of traditional healers in the study area were harvesting medicinal plants from the wild environment. Comparable trends in harvesting medicinal plants from the wild were also reported [23, 27, 31-34] also reported, as medicinal plants have been growing in natural habitats (wild) and exploited to cure ailments by collecting them from natural habitats. Likewise, in other parts of the country, ethno veterinary medicinal plants mainly collected from the wild stands as reported by Yirga [35]. The finding of current study also agrees with the finding of Habib [36] in which wild plants mostly collected for livestock treatment. Similarly, Yibrah [30] reported that most of the plant species collected from wild habitats (72.41%) and few of them obtained from around home garden (27.59%) and exploited to cure and control the livestock and human diseases. This result indicates that medicinal plant species poorly preserved in the study area.

Plant Parts Used and Mode of Remedy Preparation: The traditional healers were using different parts of medicinal plants identified in the study area. Roots of the plants were the parts most frequently used to treat livestock ailments, followed by leaves however mixed uses of plant parts were rare (Fig. 1). The finding agrees with the result

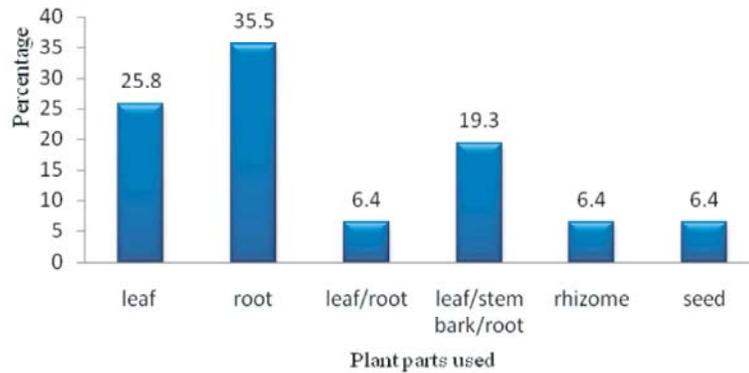


Fig. 1: Parts of medicinal plants used as remedy for livestock treatment in the study areas

of Gabriel [17] who stated that root was identified as the most frequently used (70%) plant part followed by whole plant (7.5%), fruit (5%), leaves and stem (5%) for treatment of cattle diseases in Uganda. Many studies conducted elsewhere in Ethiopia showed the dominance of leaves in the preparation of remedies. This was because leaves contain many metabolites with characteristic anti-illness effects [24, 32, 37, 38]. In contrast, Birhane [39] indicated root as the most commonly harvested plant part in a study carried out in other Ethiopian regions. A study conducted in Oromia region of Ethiopia also witnessed the common usage of root [23]. Harvesting root of a plant poses more threat to survival of plant than collecting other parts such as fruits, seeds and leaves [40]. Such widespread harvesting of roots or leaves, which are important for plant survival, threatens the survival and continuity of valuable medicinal plants. A plant whose roots are most used is more susceptible to extinction than that whose leaves and fruits are used unless proper conservation and sustainable measures are considered [18].

Medicinal plant used in this study were in the form of fresh (67.7%), dry (22.6%) and both in the form of fresh and dry (9.4%) (Table 6). Most of traditional healers (97.8%) reported that they collected and immediately use with no preservation but few (2.2%) preserved the plant materials by various ways like pounding and saving the powder or hanging the dried plant part either in the roof of their home or under the leaves. Ashagre [16] reported similar findings, as local community employed several methods of preparation of traditional medicines from plants, 91.5% of herbal preparations were from fresh plant parts followed by dried parts in agro-pastoralists. Most healers (93.6%) processed plant remedies mainly through chop and soaking in water with salt overnight then squeezed to separate liquid extract for plants used in fresh

whereas few (6.4%) practiced crushing and forming powder then diluted by water when need arise for plants used in dry form and it were made from preserved parts of plant. This finding is analogous to Deeba [41] who reported grinding or crushing and soaking or boiling as the most common method of drugs extraction from plants. Preparations of remedies in study area involved single medicinal plant, which is in agreement with the findings of studies conducted elsewhere in Ethiopia [28, 42] while it is believed that the potency of plant remedies could be enhanced when they are used in concoction form Abebe and Ayehu [43].

Route of Remedy Administration and Dosage: Analysis of mode of administration showed oral route (71%) was the most common followed by topical (22.6%) and nasal (6.4%) route. Those findings were consistent with findings of Teshale [44] who reported as most of medicinal plants used by pastoralists administered through oral route followed by dermal route. In study conducted by Kebu, Ensermu and Zemedu [45] reported that greater than half of plant remedies studied administered orally. A few studies, however, reported predominantly the dermal application of remedies and to lesser extent oral administration [35]. Ashagre [16] reported similar to this study finding as the most commonly used route of administration of traditional remedies were oral (67.19%). Similarly, Gabriel [17] reported three different routes of administration of which oral route (68.5%) was the highest, followed by topical route (22.2%) and eye drop (9.3%). Majority of traditional healers (94.85%) were not reported standardized dosing and treatment duration while few respondents were using different local measurement units to determine the dosage of plant medicine and treatment duration. Local units for

Table 4: Result of preference ranking of medicinal plants reported for treating livestock diarrhea

Plant species to treat livestock diarrhea	Key informants (1-12)												Total	Rank
	1	2	3	4	5	6	7	8	9	10	11	12		
<i>Acalyph indica</i> . L	2	5	3	5	4	4	3	5	4	3	4	5	47	1
<i>Mentha longifolia</i> L	1	2	4	3	3	2	5	2	2	4	5	3	36	3
<i>Butea monosperma</i> . Taub	4	3	1	1	2	3	2	4	3	2	3	2	30	5
<i>Balanites aegyptiaca</i>	3	1	2	4	1	1	4	1	5	1	2	1	33	4
<i>Olea europeae</i> .L	5	4	5	2	5	5	1	3	1	5	1	4	46	2

N.B: score in the table indicate ranks to given to medicinal plants based on their efficiency. Highest number (5) for plant remedy that the key informants thought was most effective in treating livestock diarrhea in the study area and the lowest number (1) for the least effective plant remedy

Table 5: List of different factors that affect medicinal plant species in the study area

Factors	Number of informant listed	Proportion (%)
Expansion of <i>Prosopis juliflora</i>	48	26.7
Agricultural activity	39	21.7
Drought	37	20.5
Overgrazing	31	17.2
Collection as fire wood	25	13.9
Total	180	100

instance, half cup, full cup and liter employed depending on age and types of livestock species to be treated. The dose determination varied from healer to healer, disease to disease, even for the same type of ailment and the dose given depends on age, physical appearance and health conditions. This also observed in other ethno-veterinary surveys [13, 14, 27]. Majority healers (87.6%) prescribed plant remedies for livestock treatments until cure whereas few healers (12.4%) administered for a week. In this study, all respondents reported as the remedies have no adverse effects on animals. The variation in quantity, unit of measurement and duration of treatment of prescribed plant preparations also noted in a study conducted elsewhere in the country [39]. Getahun [46] reported that lack of precision and standardization of preparations are two of the drawbacks of traditional health care system.

Preference Ranking of Medicinal Plants: Preference ranking exercise with twelve randomly selected key informants for five medicinal plants that were reported to be used against livestock diarrhea, the most frequently reported livestock diseases in the study area, showed that *Acalyph indica*.L and *Olea europeae*. L the first two preferred medicinal plants (Table 4).

Mode of Ethno-Veterinary Knowledge Transfer: The mode of transfer of endogenous knowledge on ethno-veterinary medicinal plants in the study area was not codified in written form; all healers are accepted orally from their forefathers and transmitted similarly to their children, most often to the one who keep their secret.

This was corresponding with studies in other parts of Ethiopia [13], Pakistan [13] and Brazil [47, 48]. The apparent lack of transfer of ethno-veterinary knowledge from older to younger generations was a cause of concern in all studies [49, 50].

Threats to Medicinal Plants: The major factors affecting the wealth of medicinal plants in the study area indicated in Table 5. The principal threats of medicinal plants in the area reported to include expansion of invasive plants (*Prosopis juliflora*), agricultural activity, drought, overgrazing and firewood collection. The key informants also emphasized that *Prosopis juliflora* as a major threat to the ethno-veterinary plant species, which cover many parts of the land reducing capacity to grow medicinal plants as well as forage plants. This finding disagree with the result of Yibrah [30] who noted that the medicinal plants largely found in the natural habitats faced a major threat to their survival of the mother plants due to the combined effect of factors like cultivation of marginal lands and herbal preparation in the other part of the country. Likewise, Lulekal [23] reported that deforestation due to agricultural expansion is the greatest threat to woody plants in southeast part of Ethiopia.

Medicinal Plant Marketing: Majority of medicinal plants were not on sale in the local markets of the study area, but only a few were reported to be sold, for instance, *Nicotinum tabacum* and *Zinger officinale* were available in market for sale as medicinal plants in few occasion as well as spices or stimulant. However, anyone who needs

Table 6: List of medicinal plants identified as ethno-veterinary for treatment of livestock ailments

Scientific names of plant	Family	Local name of plants	Growth form	Diseases treated	Parts used	Form used	Method of preparation	Dosage administered/ Route of admin.	Livestock type
1. <i>Berberis lycium</i> . Royle	<i>Berberidaceae</i>	Shifowayne	Sh	CCPP/ Cough	Root	Dr	Chopped with water	1 litter, oral	Camel, cattle, goat and sheep
2. <i>Paederia foetida</i> . L.	<i>Rubiaceae</i>	Carmo'sageer	Sh	Wound healing	Root	Fr	Roots Chopped with water	Wash for the injured part for 3-4 times, topical	Camel, cattle, goat and sheep
3. <i>Trichilia</i> spp.	<i>Meliaceae</i>	Malmal	T	Ectoparasites (ticks)	Seed	Dr	Chopped with water and extract	Wash external parasite few days, topical	Camel, cattle, goat and sheep
4. <i>Indigofera amorphoides</i> . Jaub	<i>Fabaceae</i>	Duqus	H	Bloating	Seed	Fr/dr	Crushed with water	¼ liter, oral	Cattle
5. <i>Acalyph indica</i> . L.	<i>Euphorbiaceae</i>	Shunfax/salid	H	Diarrhea	Leaf	Dr	¼ kg of leaves powders mixed in water	given orally	Camel
6. <i>Aspharagus racemosus</i> . Mill	<i>Liliaceae</i>	Dhiiga dumarka	H	Bloating	Rhizome	Dr	Rhizome powder mixed with water	4-5 pieces of rhizome 2cup, oral	Camel
7. <i>Olea europeae</i> . L.	<i>Oleaceae</i>	Dhaqabka	T	Diarrhea	Leaf	Fr	Leaves were Chopped and mixed with water	1cup, oral	Goats
8. <i>Euphorbia abyssinica</i>	<i>Euphorbiaceae</i>	Cir wisiisi	Sh	Evil eye	Leaf and root	Fr	Crushed and mixed with water & drink	¼ liter, oral	Sheep/goat
9. <i>Malva neglecta</i> . Wall	<i>Euphorbiaceae</i>	Qalan	Sh	Body swell	Root	Fr	Chopped with water	1lit, oral	Camel
10. <i>Aloe trichosantha</i> . Berger	<i>Aloeaceae</i>	Daqalsa	H	CCPP/ cough	Leaf, stem and root	Fr	Fresh parts were chopped and juice given	2cups, oral	Cattle
11. <i>Azadirachta indica</i> . Juss	<i>Meliaceae</i>	Geed hindi	T	Body swell	Leaf, stem and root	Fr	Extracts mixed with water and salt	Depend on type, oral	Cattle, camel & goat
12. <i>Syzygium cumini</i> . L.	<i>Myrtaceae</i>	Wiyiil	T	Diarrhea	Leaf, stem & root	Fr	Stem bark juice given twice a day	1lit, decoction	Camel
13. <i>Pueraria tuberosa</i> . Will	<i>Fabaceae</i>	Lalayas	Sh	Kidney problems	Leaf and root	Fr	Crushed leaf or root extract given orally	Depend type of size, decoction	Camel and cattle
14. <i>Rumex nervosus</i>	<i>Polygonaceae</i>	Barartiire	H	Eye problems	Root	Dr	Root powder used to heal wound	2 spoons, topical	Goat
15. <i>Mallotus philippensis</i> . Lam	<i>Euphorbiaceae</i>	Dibbaw	H	Hayna bite	Leaf, stem and root	Fr/ dr	Liquid juice over the wound	Wash the wound	Camel
16. <i>Nicotiana tobacum</i>	<i>Solanaceae</i>	Jiic	H	Body swell	Leaf	Fr	Leaves crushed with water	2cups, nasal	Cattle and camel
17. <i>Euphorbia geniculata</i>	<i>Euphorbiaceae</i>	iin	H	Skin diseases	Root	Fr	Roots grounded and extract juice	1lit, polish over the skin	Camel and goat
18. <i>Aloe spp</i>	<i>Aloaceae</i>	Dacar	Sh	Snake bite	Root	Fr	Chop with water and wash	One and half lit, topical	Young camel
19. <i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Calyocad	T	Internal parasite	Leaf, stem and root	Fr	Chop with water and given orally	2cups, oral	Camel, cattle, sheep
20. <i>Lawsonia inermis</i> . L.	<i>Lythraceae</i>	Calyodhig	T	Diarrhea	Root	Fr	Grounded fresh root mixed with camel milk	1cup, decoction	Cattle
21. <i>Acacia oerfota</i>	<i>Fabaceae</i>	Xiiga	Sh	Kidney problem	Leaf, stem and root	Fr	Parts were grounded and mixed with water	1-2 cups based on size, decoction	Cattle
22. <i>Senna alexandrina</i> . Mill	<i>Fabaceae</i>	Jaleelo	Sh	Internal parasite	Leaf	Dr	Mix powder with water and drink	2cups, oral	Cattle, goat and sheep
23. <i>Solanum hastifolium</i> . Hochst	<i>Solanaceae</i>	Kariir	Sh	Rabies	Root	Fr	Crush root bark with water	2cup, decoction	Camel
24. <i>Senna italica</i> . Mill	<i>Fabaceae</i>	Jaleloo	Sh	Rabies	Leaf	Dr	Dried leaf powder	½ lit, decoction	Goat and sheep
25. <i>Mentha longifolia</i> . L.	<i>Lamiaceae</i>	Xabakadi	Sh	Diarrhea	Root	Fr	Roots were boiled & given to cattle	2 cups, oral	Camel
26. <i>Butea monosperma</i> . Taub	<i>Fabaceae</i>	Dhaqab	T	Diarrhea	Leaf	Fr	Leaves were crushed with water	1lit, oral	Cattle
27. <i>Balanites aegyptiaca</i>	<i>Balanitaceae</i>	Geed dhqii	T	Diarrhea	Root	Fr	Grounded root juice	1lit, decoction	Goat
28. <i>Cyperus rotundus</i> . L.	<i>Cyperaceae</i>	---	H	Fever/shivers	Root	Fr	Root crushed and juice given orally	2 cups, oral	Cattle and goat
29. <i>Ruta chalepensis</i> . L.	<i>Rutaceae</i>	Taltan	H	Wounds on skin	Leaf	Fr	Leaves grounded with water	Wash twice a day, topical	Cattle and goat
30. <i>Zinger officinale</i> . Rose	<i>Zingiberaceae</i>	Singibill	H	CCPP/ cough	Rhizome	Fr/dr	Rhizome crushed	1cup/1/2lit, nasal/decoction	Sheep/goat
31. <i>Calpurnia aurea</i> . Benth	<i>Fabaceae</i>	Dhekat	Sh	Internal parasite	Leaf	Fr	Crushed leaves mixed with water	1 cup, oral	Sheep

Note: CCPP= Contagious carpine pleuropneumonia, H= herb, Sh= shrub, T=tree, Fr=fresh, Dr=dry

them for curing livestock disease should immediately contact the traditional healers in the community and described the symptoms of disease then healers soon collect appropriate plant part. Those traditional healers request a little charge for remedies but the charges vary based on the sources and availability of medicinal plants and number of animals treated. Traditional healers gave remedies free of charges for relatives.

CONCLUSIONS

Thirty-one plant species belonging to eighteen families were identified to be used to cure different livestock health problems. Majority of plant species fall under Fabaceae and Euphorbiaceae. The most commonly used plant parts were roots in fresh immediately after collection. Remedy preparation was mainly through chop then soaked overnight in concoction of water and salt then squeezed to separate liquid extract for plants used in fresh. Oral, topical and nasal route were the common mode of administration with no standardized dosing and treatment duration. The principal threats to ethnoveterinary medicinal plants were expansion of invasive plants (*Prosopis juliflora*), drought, overgrazing, agricultural activity and firewood collection. Endogenous knowledge on ethno-veterinary medicinal plants was accepted orally from healer's forefathers and transmitted similarly to their children. Awareness should raise and ethno-veterinary knowledge should integrate in to livestock extension delivery systems for the need to exploit the possibility of discovering more medicinally viable plants and conservation measures should undertake to ensure the continued availability of effective medicinal plants. Further studies needed under controlled conditions on the efficacy and veterinary properties of such plant products and livestock disease treatments.

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