Botanical ethnoveterinary therapies used by agro-pastoralists of Fafan zone, Eastern Ethiopia

Teka Feyera 1, Endalkachew Mekonnen 2, Befekadu Urga Wakayo 1 and Solomon Assefa 3*

Abstract

Background: In Ethiopia, plant based remedies are still the most important and sometimes the only source of therapeutics in the management of livestock diseases. However, documentation of this indigenous knowledge of therapeutic system still remains at a minimum level. The aim of this study was, thus, to document the traditional knowledge of botanical ethnoveterinary therapies in the agro-pastoral communities of Fafan Zone, Eastern Ethiopia.

Methods: The study employed a cross-sectional participatory survey. Purposive sampling technique was applied to select key respondents with desired knowledge in traditional animal healthcare system. Data were gathered from a total of 24 (22 males and 2 females) ethnoveterinary practitioners and herbalists using an in-depth-interview complemented with group discussion and field observation.

Results: The current ethnobotanical survey indicated that botanical ethnoveterinary therapies are the mainstay of livestock health care system in the studied communities. A total of 49 medicinal plants belonging to 21 families, which are used by traditional healers and livestock raisers for the treatment of 29 types of livestock ailments/health problems, were identified in the study area. The major plant parts used were leaves (43%) followed by roots (35%). In most cases, traditional plant remedies were prepared by pounding the remedial plant part and mixing it with water at room temperature.

Conclusion: The various types of identified medicinal plants and their application in ethnoveterinary practice of Fafan zone agro pastoralists indicate the depth of indigenous knowledge in ethnobotanical therapy. The identified medicinal plants could be potentially useful for future phytochemical and pharmacological studies.

Keywords: Ethnoveterinary, Medicinal plants, Livestock diseases, Fafan zone, Agro-pastoralist

Background

Livestock production is an integral part of the Ethiopian agricultural sector that approximately shares 40% of the national agricultural output [1]. Previously, it was reported that Ethiopia has the largest livestock population in Africa [2]. However, due to the prevailing animal diseases, the economic benefits gained from this sector still remain marginal. Animal diseases are among the principal causes of poor livestock performance and cause of high economic losses in the country [3, 4].

Conventional veterinary service is still less developed in the country, which is characterized by lack of adequate animal health infrastructure, veterinary clinics, and veterinarians. Furthermore, most modern drugs are expensive and not affordable to the majority of Ethiopian farmers and pastoralists [5, 6]. The majority of livestock raisers in Ethiopia are far away from the sites of animal clinic stations [7]. These factors make Ethiopian livestock raisers rely on endogenous ethnoveterinary knowledge and practices (mainly botanical products) for the management of diseases of their domestic animals. The traditional remedies are socially acceptable, inexpensive and locally available [8, 9].

However, very little of the ethnoveterinary knowledge of Ethiopian famers and pastoralists in relation to the
use of medicinal plants is so far properly documented and analyzed [5, 6, 10]. It is estimated that up to 90% of current livestock diseases are managed through the use of traditional medicines [11]. WHO stated: the use of natural products in control of animal and human diseases are considerably effective [12].

In most scenarios, the traditional medical knowledge in Ethiopia is passed verbally from generation to generation. In addition, valuable information can be lost whenever a traditional medical practitioner passes without conveying his/her knowledge on traditional medicinal plants. Similarly, ethnoveterinary practice in the country is being affected by acculturation and depletion of plants as a result of population pressure, drought, environmental degradation, deforestation and over exploitation of the medicinal plants [13, 14]. Consequently, there is a pressing need to document medicinal plants used and the associated indigenous knowledge by conducting ethnobotanical studies [15, 16].

Compared to the multiethnic cultural diversity and the diverse flora of Ethiopia, the studies conducted on the traditional ethnoveterinary medicinal plants in Ethiopia are very limited [17]. In recent years, few ethnoveterinary surveys have been conducted in different areas of the country [10, 17–28]. As it is factual throughout the country, in Ethiopian Somali Regional State (ESRS), ethnoveterinary knowledge is believed to be rich and worth documenting. However, there is gap of information on the level, scope, role and limitations of plant based remedies in the traditional animal healthcare system. Thus, this ethnobotanical survey was initiated in view of documenting the indigenous knowledge associated with utilization of botanical ethnoveterinary therapies for the management of livestock ailments among the agropastoralist communities of Fafan Zone, Eastern Ethiopia.

### Methods

#### Study area

The study area covers the Babile district and part of Jigjiga district, found in Fafan zone of ESRS (Fig. 1). The zone is situated in the northern part of ESRS. The total land coverage of the zone is 40,861 km², of which the rangeland extends over 36,629 km². About 52.6%, 31% and 7% of the landscape of the zone can be categorized as flat to gentle slopes, hills and steep slope, respectively. Fafan zone comprises pastoralism, agro-pastoralism and sedentary production systems. Agropastoralism (95%) is the dominant production system in the zone [29].

The zone geographically lies between 8° 44′ N to 11° 00′ N latitude and 40° 22′ E to 44° 00′ E longitude. The altitude of the zone ranges from 500 to 1650 m above sea level. The mean minimum and maximum temperature ranges from 16 to 20 °C and 28–38 °C, respectively [30]. The rainfall distribution in the zone is very erratic with a mean annual rainfall of 600 to 700 mm [31].

#### Study design

A cross-sectional, participatory study was employed to collect ethnoveterinary information from traditional healers in Fafan zone of ESRS between April, 2014 and August, 2015. Indigenous ethno-botanical knowledge, resources and their applications were the main study parameters.

#### Sampling procedure

A purposive snowball sampling technique was used to select study participants i.e. ethnoveternicians. This approach aids in acquiring the desired quality and quantity of information on traditional animal health care systems [32]. Ultimately, a total sample of 24 (22 males and 2 female) key respondents were selected.

#### Ethnobotanical data collection

Ethnobotanical data were mainly gathered through repeated field trips and investigations, with individual interviews, group discussion, and field observations using the same format used by [33] and [34]. Participant interviews were conducted using semi-structured questionnaires prepared in English and administered in local language (Somali) with the help of competent local translators. Data collected comprise: indications, local name, parts used in traditional remedies, mode of preparation (dosage), and route of administration of each medicinal plant against livestock diseases. Moreover, manner of indigenous knowledge transfer was recorded.

#### Plant specimen collection and identification

Ensuing interviews with selected key respondents, a field trip was arranged to identify and collect specimen of reported indigenous medicinal plants from their natural vegetation for further botanical identification. Botanical identification of plant specimens was conducted using herbarium materials and taxonomic keys described in various volumes on the Flora of Ethiopia [35, 36]. For each plant species, voucher specimens were given a collection number and deposited in the National Herbarium, Addis Ababa University.

#### Enumeration of documented plants

A list of plants and plant products traditionally used to manage animal health problems in the agro-pastoralist communities of Fafan zone was documented. The documentation compiled their scientific and vernacular names, family names, disease and ill-health conditions treated, target type of livestock and the preparation forms of
different remedies (Table 2). The names of plants were arranged according to their alphabetical order.

Data analysis
Microsoft Excel spreadsheet software was employed for organizing and analyzing the collected ethnobotanical data. Descriptive statistical methods (percentage and frequency) were used to summarize data on reported medicinal plants and associated indigenous knowledge.

Results and discussion
Socio-demographic characteristics and experience of ethnoveterinary practitioners
Majority of the ethnoveterinary practitioners surveyed in Fafan zone were rural residents and males. Other studies have similarly shown that practice of Traditional Medicine in Ethiopia is largely dominated by men [25, 37]. Majority of the participants have been practicing ethnoveterinary medicine for ≥10 years. Ethno-veterinary knowledge of the traditional healers was usually obtained from family members or religious institutions (Islamic madrasas) which are passed through generation with word of mouth (Table 1). The way traditional veterinary medicine is acquired by the practitioners is largely similar to traditional human medicine. The traditional healers claimed that there is a considerable overlap in the utilization of some of the reported herbs against both human and livestock diseases. It was also interesting to note that most of the sampled ethnoveterinary practitioners were also traditional healers for several human ailments.

| Table 1 Socio-demographic features and ethnoveterinary experiences of participants (n = 24) |
| --- |
| Characteristics | Category level | Frequency | Percentage (%) |
| Sex | Male | 22 | 91 |
| | Female | 2 | 9 |
| Age | 25–40 | 3 | 12 |
| | 41–55 | 9 | 38 |
| | 56–70 | 12 | 50 |
| Residence | Rural | 21 | 88 |
| | Urban | 3 | 12 |
| Educational status | Formal | 5 | 21 |
| | Religious | 18 | 75 |
| | Illiterate | 1 | 4 |
| Level of ethnoveterinary practice experience (years) | < 10 | 2 | 9 |
| | 10–20 | 6 | 25 |
| | 21–30 | 10 | 41 |
| | > 30 | 6 | 25 |
| Source of ethnoveterinary healing knowledge | Religious institution | 7 | 29 |
| | Family members or decedents | 11 | 46 |
| | Close friends and colleagues | 4 | 16 |
| | Other senior traditional healers | 2 | 9 |
| Mode of ethnoveterinary service delivery | Always charging | 3 | 12 |
| | Sometimes charging | 12 | 50 |
| | Free (not charging) | 9 | 38 |
| Scientific name                     | Family          | Vernacular name | Part(s) used | Indication                  | Method of preparation and application                                                                 | Livestock species treated | Voucher number |
|------------------------------------|-----------------|-----------------|--------------|-----------------------------|--------------------------------------------------------------------------------------------------------|---------------------------|----------------|
| Abutilon anglosomalia Cufod.       | Malvaceae       | Balanbaal       | Leaf         | Non-specific external wound | Grounded leaves are applied to wound and washed later                                                  | All Livestock             | TF-05          |
| Abutilon bidentatum Hochst. ex A.Rich. | Malvaceae       | Maran           | Root         | Hyena/Jackal bite wound     | Crushed root is applied to affected area                                                              | Cattle                    | TF-25          |
|                                    |                 |                 | Leaf         | Helminthiasis, Abdominal pain and Snake bite | Decoction drenched orally                                                                                     | Cattle, sheep and goat   |                |
| Acacia mellifera (Vahl) Benth.     | Mimosaceae      | Bilcin          | Bark and Root | Retained placenta            | Crushed root and bark concocted with Acacia oerfota root is administered vaginally to clean uterus     | Camel                     | TF-06          |
| Acacia oerfota (Forssk.) Schweinf. | Mimosaceae      | Gum             | Bark         | Infertility                  | Bark placed in vagina to kill semen from previous unsuccessful mating                                 | Cattle                    | TF-34          |
|                                    |                 |                 | Bark         | Infertility                  | Bark placed in vagina to kill semen from previous unsuccessful mating                                 | Cattle                    |                |
| Acacia tortilis (Forssk.) Galasso&Banfi | Mimosaceae      | Madheedh        | Gum          | Non-specific external wound  | Gum is applied to wound topically                                                                     | All Livestock             | TF-39          |
| Adenium aculeatum (Forsk.)         | Apocynaceae     | Dhalaandhux     | Stem/Root    | Ringworm                     | Crushed root or stem dispersed in water is applied to lesions                                          | Cattle                    | TF-20          |
| Adenium oesum (Forsk.) Roem. & Schult. | Apocynaceae     | Aboobo wan Aad, Aboobo-gunweyn | Stem         | Mange infestation            | Inside of the stem which has been fermented for two days is applied to mange lesions                   | Camel                     | TF-37          |
| Boscia minimifolia Chiov.          | Capparaceae     | Meygaag         | Bark and Leaf | Bloat                        | Crushed bank and leaf mixed with water is drenched orally                                             | Cattle                    | TF-31          |
| Carullum speciosa N.E.Br.          | Asclepiadaceae  | Udaabeys        | Leaf/Stem    | Ringworm                     | Leaves/stem juice is applied to lesions                                                                | Cattle                    | TF-17          |
|                                    |                 |                 | Leaf         | Eye injury or infection      | Powdered leaves mixed with oil is applied locally as ointment                                          | Cattle, sheep and goat   |                |
| Catha edulis (Vahl) Forssk. ex Endl. | Celastraceae    | Jaad, qat       | Leaf         | Helminthiasis/ Diarrhoea    | Crushed leaves mixed with water is used as oral drench or mixed with feed and fed                      | Sheep and goat            | TF-28          |
| Celosia polystachia                | Amaranthaceae   | Iaareys         | Leaf         | Non-specific external wound  | Crushed leaves mixed with oil is applied to wound                                                      | Cattle                    | TF-22          |
| Cissus quadrangularis L.           | Vitaceae        | Gaad            | Aerial part  | Tick infestation and external wound | Crushed aerial part mixed with water is applied topically                                             | Cattle and Camel          | TF-02          |
|                                    |                 |                 | Leaf         | Mastitis, Helminthiasis and Leach infestation              | Crushed leaf mixed with water is drenched orally                                                      | Cattle and camel          |                |
| Plant Name | Family | Part Used | Disease | Treatment Method | Species |
|------------|--------|-----------|---------|-----------------|---------|
| Cistanche phelypeae L. Cout. | Orobancheaceae | Aerial part | Black leg | Decoction drenched orally | Cattle |
| Commiphora erlangeriana Engl. | Bursaraceae | Leaf and root | Trypanosomiasis | Chopped, mixed with water and drenched orally | Camel |
| Commiphora erythrea (Ehrenb.) Engl. | Burseraceae | Leaf and root | Trypanosomiasis | Chopped, mixed with water, left overnight and used as wash | Cattle |
| Commiphora ogadenis Chiov. | Burseraceae | Xagar | Mange infestation and ring worm | Cooked gum with animal's urine is applied to the lesion; Leaf and gum burnt and applied to lesion | Camel |
| Commiphora serrulata Engl. | Burseraceae | Leaf | Orf | Leaf concocted with C. drangularis and mixed with animal urine is cooked and applied to the lesions | Sheep and goat |
| Crabbea velutina S. Moore | Acanthaceae | Leaf | Hyena/Jackal wounds | Grounded leaves applied to wound and washed after three days | Donkey |
| Crotalaria albicaulis Franch. | Fabaceae | Leaf | Trypanosomiasis | Leaf extracted with water and concocted with leaf of C. phelypeae is drenched orally | Cattle |
| Cucumella kelleri (Cogn.) C.Jeffrey | Cucurbitaceae | Root | Infertility | Root is inserted into vagina with Acacia oerfota to attract bull | Camel |
| Cucumis prophetarum L. | Cucurbitaceae | Root | Infertility | Root inserted into vagina with A. oerfota to attract bull | Cattle and Camel |
| Cucumis pustulatus Hook. f. | Cucurbitaceae | Fruit | Non-specific external wound | Fruit pulp and seed applied to wound | All Livestock |
| Cyphostemma cyphopetalum (Fresen.) Desc. ex Wild & RB.Drumm. | Vitaceae | Root | Non-specific external wound | Powder of dried and crushed root is applied | All Livestock |
| Cyphostemma serpens (Hochst. ex A.Rich.) Desc. | Vitaceae | Root | Non-specific external wound | Powder of dried and crushed root is applied | All Livestock |
| Dichrostachys cinerea Wight et Arn. | Mimosaceae | Stem | Hyena/Jackal bite wounds | Burned stem is applied to wound | All Livestock |
| Dichroa stachys cinerea Wight et Arn. | Mimosaceae | Stem | Lice infestation and Snake bite | Crushed stem mixed with water is used as wash; Crushed and applied to affected area | Cattle (Calf) |
| Entada leptostachya Harms | Asclepiadaceae | Root | Coughing | Grounded root mixed with water is given intranasal or mixed with feed and fed | Goat |
| Euphorbia hirta L. | Euphorbiaceae | Latex | Non-specific external wound | Latex/juice is applied to wound | All Livestock |
| Plant Name                  | Genus                  | Family       | Part Used | Ailment                  | Preparation and Application                                                                 | Livestock      | TF  |
|----------------------------|------------------------|--------------|-----------|--------------------------|-----------------------------------------------------------------------------------------------|----------------|-----|
| Euphorbia longispina Chiov.| Euphorbiaceae          | Qabo Latex   | Non-specific external wound | Latex is applied to wound                                                                   | All Livestock   | TF-43|
| Euphorbia schizacantha Pax | Euphorbiaceae          | Qabo-yare    | Whole plant | Non-specific external wound | Whole plant crushed, dried and used as powder. Juice also applied to the affected area          | Cattle and camel | TF-42|
| Indigofera amorphoides Jaub. & Spach | Fabaceae | Meydhax-dhee | Root | Tick and Lice infestation | Crushed (broken) root is applied to ticks/lice                                                  | Cattle, sheep and goat | TF-18|
| Ipomoea cicatricosa L.     | Convolvulaceae         | Weylo-wad    | Root | Joint diseases            | Crushed root is applied topically                                                               | Cattle         | TF-48|
| Jatropha spicata Pax       | Euphorbiaceae          | Mawe         | Root | Non-specific external wound | Crushed root is applied topically to wound                                                        | All livestock   | TF-15|
| Indigofera amorphoides Jaub. & Spach | Fabaceae | Meydhax-dhee | Root | Tick and Lice infestation | Crushed (broken) root is applied to ticks/lice                                                  | Cattle, sheep and goat | TF-18|
| Ipomoea cicatricosa L.     | Convolvulaceae         | Weylo-wad    | Root | Joint diseases            | Crushed root is applied topically                                                               | Cattle         | TF-48|
| Jatropha spicata Pax       | Euphorbiaceae          | Mawe         | Root | Non-specific external wound | Crushed root is applied topically to wound                                                        | All livestock   | TF-15|
| Justicia generifolia       | Acanthaceae            | Buuxiso      | Leaf | Non-specific external wound | Crushed leaves is applied to wound                                                               | Cattle         | TF-32|
| Kleinia abyssinica (A.Rich.) A.Berger, | Asteraceae | Godor-cad | Rhizome | Sexual impotency | Fresh rhizome is given to bulls to enhance libido                                               | Cattle         | TF-35|
| Lycium shawii Roem. & Schult. | Convolvulaceae         | Surad        | Root | Non-specific external wound | Crushed root applied near to site of embedded thorns                                                | Camel           | TF-29|
| Moringa barziana Mattei    | Moringaceae            | Mawe         | Root | Coughing            | Crushed root mixed with boiled water is drenched orally                                           | Sheep and goat  | TF-21|
| Pergularia daemia (Forssk.) Chiov. | Asclepiadaceae         | Gees-rijaad  | Leaf | Non-specific external wound | Leaf juice is applied to affected area                                                             | Cattle         | TF-16|
| Psilotrichum gnaphalobryum (Hochst) Schinz | Amaranthaceae | Booga-dhaye | Leaf | Non-specific external wound | Crushed leaves concocted with Ipomoea cicatricosae is applied to wound                               | Donkey          | TF-47|
| Pupalia lappcea L. Juss.   | Amaranthaceae          | Maro-boob, dhegmaanyo | Leaf, fruit | Retained placenta, painful joints and wound | Juice or paste is applied to lesion or affected area                                               | Cattle, sheep and goat | TF-04|
| Salvadora persica L.       | Salvadoraceae          | Caday        | Root | Non-specific external wound | Crushed root is applied topically                                                               | Cattle         | TF-27|
| Sarcostemma andongense     | Asclepiadaceae         | Xangey-dhurwaa | Leaf | Snake bite | Leaf juice is applied orally                                                                  | All livestock   | TF-30|
| Hern                      |                        |             |           |                           |                                                                                                  |                |     |
| Schinus molle L.           | Anacardiace            | Mirmiri      | Leaf | Tick infestation         | Crushed leaves rubbed on to ticks                                                               | Cattle and sheep | TF-01|
|                            |                        |             |           |                           |                                                                                                  | Cattle and sheep | TF-01|
|                            |                        |             |           |                           |                                                                                                  | Sheep and goat | TF-04|
|                            |                        |             |           |                           |                                                                                                  |                |     |
|                            |                        |             |           |                           |                                                                                                  |                |     |
| Plant Name                  | Family      | Common Names | Use  | Preparation                                                                 | Species                              | Affects            | Ref  |
|----------------------------|-------------|--------------|------|------------------------------------------------------------------------------|---------------------------------------|--------------------|------|
| Seddera pedunculatae       | Solanaceae  | Urudhi, Xunboox | Fruit | Non-specific external wound                                                  | Fruit juice is applied topically     | Cattle and        |      |
| Solanum dubium fesen       | Solanaceae  | Waniye, xunboox, kiriri | Fruit/Leaf | Tick infestation                                                            | Fruit/leaf sap concocted with leaf of Schinus molle is applied on tick infested area | Camel TF-36        |      |
| Solanum incanum L.         | Solanaceae  | Waniiye, xunboox | Seed | infertility                                                                 | Seed inserted into vagina to attract bull | Cattle and camel TF-07 |      |
| Solanum jubae Bitter       | Solanaceae  | Kiriiri, xunboox | Leaf | Ring worm and swollen joints                                                 | Crushed parts extracted in water is applied locally | Cattle and camel TF-07 |      |
| Zanthoxylum chalybeum Engl. | Rutaceae    | Geed-dixri | Fruit | Coughing/pneumonia/mastitis                                                  | Fruit sap is applied orally/nasally or locally | Goat TF-24         |      |

Table 2: List of traditional medicinal plants used to treat different livestock ailments among the agro-pastoralist communities of Fafan Zone (Continued)
The present study showed that the agro-pastoralist communities in Fafan Zone of ESRS use a variety of medicinal plant species to treat a range of livestock health problems. A total of 49 medicinal plants were reported for the treatment of different livestock ailments. The reported medicinal plants are botanically categorized under 21 plant families (Table 2).

Data from the present study showed that Mimosaceae (5 species), and Solanaceae, Bursuraceae, Asclepiadaceae and Euphorbiaceae (4 species each) took the superior share of the reported plant families, followed by Vitaceae, Amaranthaceae, Cucurbitaceous and Convulvolaceae (3 species each). In agreement with this study, Solanaceae, Bursuraceae and Cucurbitaceous have also been reported to be dominant families in other parts of the country [25, 38–40]. The fact that Solanaceae, Bursuraceae, Mimosaceae, Asclepiadaceous and Euphorbiaceae contributed relatively higher number of medicinal plants might be attributed to better abundance of species in the study area belonging to these families.

This study revealed that the most frequently used part of plants was leaf (43%) followed by root (35%) (Fig. 2). Other parts of the plant reported to be used were fruit (14%), stem (10%), bark (10%), seed, gum, latex, rhizome and aerial parts of the plants. Moreover, the entire plant was used in some cases (6%). In consonant with the present study, studies conducted elsewhere in Ethiopia indicated that leaves were the most frequently used plant part to treat livestock ailments [10, 22, 5, 20]. A study conducted by Poffenberger et al. [41] indicated that collection of leaves for traditional remedies poses no significant threat to the survival of plants in comparison with other parts; such as roots, stem, bark and whole plant. On contrary, harvest involving roots, rhizomes, bulb, bark and stem have a serious threat on the survival of the mother plant in its habitat. In this regard, the present study indicated that root was the second commonly utilized part of the medicinal plant, which shows the presence of high risk on the survival of those reported plants in the study area.
In this study, majority (84%) of traditional remedies were prepared using a single medicinal plant. Single plant species based preparations also accounted for majority (65%) of traditional remedies in Afar [5]. However, single plant based preparations were reported at lower frequency from other parts of Ethiopia [22, 42].

In most cases, traditional plant remedies were prepared by pounding the remedial plant part and mixing it with water at room temperature. This is in line with the report of other studies [39, 40]. Some of the plants are prepared and administered in the form of topical route of administration without mixing using water. Topical applications of paste (poultice), sap, and other formulations were reported by other investigators to be common in traditional veterinary practice [18].

Types of livestock and major livestock health problems treated
The therapeutic indication of medicinal plant based remedies in Fafan zone covered all livestock species (Fig. 3) and around 29 distinct disease problems. Medicinal plant remedies were more frequently indicated for diseases affecting cattle and camels, followed by small ruminant and equine diseases. This variation is probably a reflection of the abundance and value of different livestock species in the study area rather than the therapeutic range of medicinal plants themselves.

Traditional medicinal plant remedies were prescribed against 29 different types of livestock ailments/health problems (Fig. 4). This study generally revealed that most of the traditional medicines used in the area are used for the management of skin diseases and removal of ecto-parasites. Unspecified wounds were reported to be the indication of majority of medicinal plants (18) (Fig. 4), followed by helminthiasis (6), tick infestation, respiratory disorders characterized by coughing and infertility (5). Out of the 29 animal health problems reported to be treated by ethnomedical remedies, 15 (51.7%) are treated by only one medicinal plant species.

Conclusions
The study suggests that the agro-pastoralist communities of the study area largely depend on ethnoveterinary medicinal plants for the treatment of different animal ailments. In total, 49 medicinal plants were reported to have been used by the ethnoveterinary practitioners and livestock raisers. Leaf followed by root was the most frequently used plant part in the preparation of ethnoveterinary remedies. The identified medicinal plants could be potentially useful for future phytochemical and pharmacological studies. Thus, further studies on biological activity, phytoconstituents and safety profile of the reported medicinal plants is warranted.

Abbreviation
ESRS: Ethiopian Somali Regional State

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Availability of data and materials
The datasets used and/or analyzed during the current study and voucher number of the medicinal plants are available from the corresponding author on reasonable request.

Authors’ contributions
TF conceived, designed and coordinated the study including the process of earning fund. EM and BUW participated in data collection, analysis and drafting the manuscript. SA finalized and submitted the manuscript for publication. All the authors revised and approved the final manuscript.

Ethics approval and consent to participate
Ethical approval was obtained from the Research Ethics Committee of the Directorate of Research, Publication and Technology Transfer, Jigjiga University, Ethiopia. Only respondents who consented to participate in
the survey were asked to share their knowledge and experience on the use of medicinal plants in their communities to manage animal diseases.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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Author details
1 Department of Veterinary Clinical Studies, College of Veterinary Medicine, Jigjiga University, Jigjiga, Ethiopia. 2 Department of Basic Sciences, College of Medicine and Health Sciences, Jigjiga University, Jigjiga, Ethiopia. 3 Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, Addis Ababa University, Addis Ababa, Ethiopia.

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