Chapter 10
Ethnoveterinary Medicinal Plants Used in South Africa

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10.1 Introduction

Ethnoveterinary use of plants dates back from ancient times and it has been part of the heritage of indigenous people throughout history. Many people in developing regions around the globe have been using these traditional practices to sustain their livestock health by preventing and controlling diseases. Diseases affecting livestock have a huge impact on the economy in terms of production losses, in particular affecting cultures where livestock is equated to wealth (McGaw and Eloff 2008). Ethnoveterinary medicine may be a highly useful treatment for common ailments, such as mild diarrhoea, skin diseases, intestinal worms and wounds. Ethnoveterinary medicinal knowledge is commonly passed on from generation to generation orally in South Africa as in many other countries, thus there is a concern that due to urbanisation and acculturation the information may be lost, or inadequate information may be passed on to future generations. There is consequently a critical need to document the available knowledge. Additionally, studies investigating the pharmacological activity and toxicity of traditional remedies are also warranted to support and promote use of effective, safe and relatively low cost animal treatments.

South Africa is home to a wide range of temperate flora consisting of about 24,000 plant species. This region is also home to a rich diversity of cultures and traditions which are reflected by the use of different plants as medicine (McGaw and Eloff 2008). It is estimated that about 60% people in the country use plants as medicine, because most regions in developing countries consist of developing farmers who have limited access to Western health services. According to Luseba and

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Tshisikhawe (2013), farmers prefer to use traditional remedies to treat their livestock because of the greater availability, easy accessibility, low costs and apparent effectiveness of these remedies. Additionally, farmers believe that plants are safe to use and that they have less side effects on their livestock, believing that there is no necessity for withdrawal periods before the consumption of meat from animals treated with herbal remedies (Luseba and Tshisikhawe 2013).

Due to its diverse cultures, South Africa has different ethnic groups that use different ethnoveterinary remedies, and studies done by Luseba and Van der Merwe (2006) and Maphosa and Masika (2010) showed that the relationship between plant remedy and disease depends on the locality of the plants. Farmers from different ethnic groups may therefore use different plants to treat the same diseases, because different ethnic groups are located in different parts of the country where the availability of different plants varies (Luseba and Van der Merwe 2006).

Research on the ethnopharmacological properties of South African plant remedies is a very productive research field yet little has been done to determine the biological activity of these ethnoveterinary plant remedies, particularly using methods relating to their traditional preparation (McGaw and Eloff 2008). Most studies focus on laboratory-based in vitro screening because it is expensive to perform in vivo tests and specialised facilities are required. It is also important to note that the lack of activity in the in vitro screening does not automatically correspond to the lack of efficacy of the traditional medicine, so it is advisable to document and study the methods of traditional preparation and administration of the medicine (McGaw and Eloff 2008).

In 2008, a review was published on the ethnoveterinary use of southern African plants and scientific evaluation of their medicinal properties (McGaw and Eloff 2008), and future research recommendations were proposed. The list of plants documented to have been used in ethnoveterinary medicine up to 2008, as well as biological activities tested, is reproduced in Table 10.1. The present chapter aims to investigate what further research has been done on documenting the ethnoveterinary use of southern African plants over the past 10 years, and noting what further bioactivity studies have been conducted.

10.2 Ethnoveterinary Knowledge in South Africa Up to 2008

South African researchers have engaged with different communities of different regions within the country with promising results. The Rapid Rural Appraisal (RRA) approach is mostly used to obtain information about ethnoveterinary medicine (McGaw and Eloff 2008). The RRA is an approach used for quickly obtaining a preliminary understanding of a situation where specific research techniques are chosen from a wide range of options and where there is an assumption that all the relevant parts of a local system cannot be known in advance. The local system is best understood by combining the expertise of a multidisciplinary team that includes locals, while combining information collected in advance, direct observations and

Table 10.1 Plants used in South Africa for ethnoveterinary purposes, and bioactivity of tested species (reported up to 2008)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Acanthaceae	*Hypoestes aristata* (Vahl) Soland. Ex Roem. and Schult.	Used to drench calves suffering from a condition referred to as white scours	Whole plant infusions		
Alliaceae	*Agapanthus praecox* Willd.	Diarrhoea in sheep and goats (Dold and Cocks 2001)	Roots		
Amaranthaceae	*Exomis microphylla* (Thunb.) Aellen	Endometritis and vaginitis (Dold and Cocks 2001)	Leaf decoction		
Amaryllidaceae	*Ammocharis coranica* (Ker-Gawl.) Herb.	Used medicinally for cattle (Gerstner 1938)	Unspecified parts	Alkaloids, organic acid and haemolytic saponin (Watt and Breyer-Brandwijk 1962)	
Amaryllidaceae	*Boophane disticha* (L.f.) Herb.	Redwater in cattle, constipation in cattle, used to facilitate healing of broken limbs (Dold and Cocks 2001); abortion (van der Merwe et al. 2001)	Bulb, root, bulb scales		
Amaryllidaceae	*Crinum delagoense* Verdoorn	Used medicinally for cattle (Gerstner 1939)	Unspecified parts	Unknown	
Amaryllidaceae	*Crinum moorei* Hook. F.	Used medicinally for cattle (Gerstner 1939)	Unspecified parts	Lycorine, cheryrilline, crinamidine, crinidine, dihydrocrinidine and powelline and phenols (Watt and Breyer-Brandwijk 1962)	
Amaryllidaceae	*Haemanthus albiflos* Jacq.	Healing of broken limbs (Dold and Cocks 2001)	Bulb		
Anacardiaceae	*Ozoroa paniculosa* (Sond.) R. and A. Fernandes	Abdominal problems in animals (Hutchings et al. 1996); diarrhoea, redwater, sweating sickness (van der Merwe et al. 2001)	Bark, root bark	Volatile oil (Watt and Breyer-Brandwijk 1962)	

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Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Anacardiaceae	*Protorhus longifolia* (Bernh.) Engl.	Heartwater and diarrhoea in cows (Dold and Cocks 2001)	Bark		
Anacardiaceae	*Rhus incisa* L. f.	Roots given to livestock as treatment for shock after an accident, bark given to cows for diarrhoea (Dold and Cocks 2001)	Root and bark decoctions		
Anacardiaceae	*Rhus lancea* L.f.	Diarrhoea, gallsickness (van der Merwe et al. 2001)	Roots, bark		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Anacardiaceae	*Sclerocarya birrea* (A. Rich.) Hochst.	Diarrhoea, fractures (van der Merwe et al. 2001)	Bark		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Apiaceae	*Heteromorpha trifoliata* (Wendl.) Eckl. and Zeyh.	Zulus use bark for colic, scrofula and vermifuge for horses (Gerstner 1938); Xhosa use roots for threadwork in horses (Watt and Breyer-Brandwijk, 1962); Redwater, gallsickness (Masika et al. 2000)	Bark, roots	Falcarindiol and sarisan (antifungal) (Villegas et al. 1988)	
Apocynaceae	*Acokanthera oppositifolia* (Lam.) Codd	Heartwater in goats and sheep, redwater in cattle, snakebite, anthrax, tapeworm, swollen limbs (Dold and Cocks 2001)	Leaves, roots		
Apocynaceae	*Secamone filiformis* (L.f.) J.H.Ross	Infectious diseases in cattle (van der Merwe, pers. comm.)	Aerial parts		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)

Apocynaceae	*Strophanthus speciosus* (Ward and Harv.) Reber	Given to cattle for snakebite (Hutchings et al. 1996)	Unspecified	Cardiac glycosides stropeside and christyoside (Watt and Breyer-Brandwijk 1962)	
Araceae	*Zantedeschia albomaculata* (Hook.) Baill.	Medicine for cattle (Jacot Guillarmod 1971)	Unspecified parts		
Araliaceae	*Cussonia spicata* Thunb.	Leaves applied in hot fomentations to goats paralysed in their hind quarters (Palmer and Pitman, 1972); bark used for retained placenta in stock, leaves used to treat endometritis and/or vaginitis in cows, bark decoction for gallsickness in cattle (Dold and Cocks 2001; Masika et al. 2000)	Leaves, bark		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Arecaceae	*Phoenix reclinata* Jacq.	Wash to treat footrot in sheep and goats (Dold and Cocks 2001)	Roots		
Asclepiadaceae	*Sarcostemma viminale* (L.) R. Br.	Stems used to encourage lactation in cows, galactagogue in cows (Dold and Cocks 2001); wounds and maggots (Luseba and van der Merwe 2006)	Stems, aerial parts		Antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Asclepiadaceae	*Secamone filiformis* (L. f.) J.H. Ross	Diarrhoea in cattle (Dold and Cocks 2001)	Stem		
Asparagaceae	*Asparagus laricinus* Burch.	Sores, redwater, uterine infections (van der Merwe et al. 2001)	Tubers		
Asparagaceae	*Asparagus setaceus* (Kunth) Oberm.	Used to treat livestock for shock after an accident (Dold and Cocks 2001)	Roots		
Asparagaceae	*Asparagus suaveolens* (Burch.) Oberm.	Retained placenta in cows (Dold and Cocks 2001); sores, redwater, uterine infections (van der Merwe et al. 2001)	Roots, tubers		

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Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Asparagaceae	*Protasparagus virgatus* (Bak.) Oberm.	Anthelmintics for animals and humans (Watt and Breyer-Brandwijk 1962)	Root infusions or decoctions		
Asphodelaceae	*Aloe arborescens* Mill.	Used to drench sick calves (Hutchings et al. 1996)	Leaf decoctions	Aloin, barbaloin, aloe emodin, aloenin, polysaccharides, lectins and other compounds (Hutchings et al. 1996)	
Asphodelaceae	*Aloe cooperi* Bak.	Used to protect cattle from the ill effects of eating improper food (Watt and Breyer-Brandwijk 1962)	Smoke from burning leaves		
Asphodelaceae	*Aloe ferox* Mill.	Typhoid, ticks and lice in poultry, redwater in cattle (Dold and Cocks, 2001); Redwater, intestinal worms (Masika et al. 2000).	Leaves, juice from leaves		
Asphodelaceae	*Aloe greatheadii* var. *davyana* (Schönland) H.F.Glen and D.S.Hardy	Burns, general ailments, blood cleansing, internal parasites, eye infections (van der Merwe et al. 2001)	Leaves, roots, whole plant		
Asphodelaceae	*Aloe maculata* All.	Used for 'blood scours' in calves and enteritis and indigestion in poultry (Hutchings et al. 1996)	Leaf infusions		
Asphodelaceae	*Aloe marlothii* Berger	Newcastle disease in chickens (Luseba and van der Merwe 2006); gallsickness, parasites, diarrhoea, constipation, retained placenta, dystocia, maggots (van der Merwe et al. 2001)	Leaves		Antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007); anti-rickettsial (Naidoo et al. 2006); anti-babesial (Naidoo et al. 2005)

Asphodelaceae	*Aloe tenuior* Haw.	Retained placenta in cows, tapeworm, redwater, intestinal parasites (Dold and Cocks 2001)	Leaves		
Asphodelaceae	*Aloe zebrina* Baker	Wounds and maggots (Luseba and van der Merwe 2006); burns, general ailments, blood cleansing, internal parasites, eye infections (van der Merwe et al. 2001)	Fresh leaves, roots, whole plant		
Asphodelaceae	*Bulbine alooides* (L.) Willd.	Redwater in cattle (Dold and Cocks 2001)	Roots		
Asphodelaceae	*Bulbine asphodeloides* (L.) Willd.	Used to treat sick cattle and goats (Hutchings et al. 1996)	Unspecified parts		
Aspidiaceae	*Dryopteris athamantica* (Kunze) Kuntze	Retained placenta in cows by the Sotho (Jacot Guillarmod 1971)	Rhizome decoctions		
Aspidiaceae	*Polystichum* sp.	Administered to horses with bots (Hutchings et al. 1996)	Rhizome decoctions		
Asteraceae	*Arctotus arctotoides* (L.f.) O.Hoffm.	Heartwater in goats (Dold and Cocks 2001)	Whole plant		
Asteraceae	*Bidens pilosa* L.	Equine anthelmintics (Hutchings et al. 1996)	Unspecified	The polyacetylene phenylheptatriyene and chalcones (Graham et al. 1980; Hoffman and Hoelzl 1988)	
Asteraceae	*Brachylaena discolor* DC.	Anthelmintics for calves, sheep and goats (Hutchings et al. 1996)	Dried leaf milk infusions	Onopordopicrin (Zdero and Bohlmann 1987)	
Asteraceae	*Brachylaena elliptica* (Thunb.) DC.	Used for treating calves (Gerstner 1939)	Roots		
Asteraceae	*Brachylaena ilicifolia* (Lam.) Phill. and Schweick.	Diarrhoea in lambs (Dold and Cocks 2001)	Leaves		

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Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Asteraceae	*Callilepis laureola* DC.	Used to kill maggots in cattle (Watt and Breyer-Brandwijk 1962)	Root paste	Atractyloside and its aglycone, atractyligenin (Candy et al. 1977)	
Asteraceae	*Dicoma anomala* Sond.	Gallsickness in stock animals; powdered plants used for sores and wounds on horses (Watt and Breyer-Brandwijk 1962)	Root decoctions	Germacranolides (Hutchings et al. 1996)	
Asteraceae	*Microglossa mespilifolia* (Less.) B.L. Robinson	Tonics for stock animals (Hutchings et al. 1996)	Infusions from leaves and stems	Epi-friedelinol and C_{17} acetylenic compounds (Bohlmann and Fritz 1979)	
Asteraceae	*Mikania capensis* DC.	Plants used for horse sickness (Gerstner 1939)	Unspecified		
Asteraceae	*Printzia pyrifolia* Less.	Used for treating calves (Gerstner 1939)	Roots	Matricaria ester and p-coumarate (Bohlmann and Zdero 1978a)	
Asteraceae	*Schkuhria pinnata* (Lam.) Thell.	Eye infections, pneumonia, diarrhoea, heartwater (van der Merwe et al. 2001)	Aerial parts		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Asteraceae	*Senecio oxyriifolius* DC.	Swellings in animals (Hutchings et al. 1996)	Leaves	A tricyclic sesquiterpenoid, angeloyl and bisabolenes (Bohlmann and Zdero 1978b)	
Asteraceae	*Senecio tamoides* DC.	Anthrax and ‘quarter evil’ in callte (Gerstner 1939)	Unspecified parts		

Asteraceae	*Vernonia mespilifolia* Less.	Heartwater in goats (Dold and Cocks 2001)	Stems		
Asteraceae	*Vernonia neocorymbosa* Hilliard	Used by Zulus to treat calves (Gerstner 1939); root decoctions administered by Lobedu as anthelmintics to donkeys (Hutchings et al. 1996); pounded leaf and root infusions administered by Vhavenda as anthelmintics to domestic animals (Mabogo 1990)	Roots, leaves	Squalene, vernolide and vernodalin from aerial parts, and 13-hydroxybisabol-2,10-dien-1-one and small amounts of onopordopicrin in roots (Bohlmann et al. 1983)	
Balanitaceae	*Balanites maughamii*	Diarrhoea in cattle (Luseba and van der Merwe 2006)	Leaves		
Boraginaceae	*Ehretia rigida* (Thunb.) Druce	Gallsickness in cattle (Hutchings et al. 1996); fractures (van der Merwe et al. 2001)	Roots		
Capparaceae	*Capparis sepiaria* L.	Used by Xhosa for gallsickness in stock (Watt and Breyer-Brandwijk 1962)	Root decoctions		
Capparaceae	*Capparis tomentosa*	Root ash paste applied to sore teats in cows; root infusions used for stomach ailments in animals, particularly diarrhoea in cattle (Watt and Breyer-Brandwijk 1962; Pujol 1990), root decoction for gallsickness in stock (Dold and Cocks 2001)	Paste made from root ashes, root infusions and decoctions	The alkaloids stachydrine (Dictionary of Natural Products 1996) and 3-hydroxy-4-methoxy-3-methyl-oxindole (Dekker et al. 1987)	
Celastraceae	*Cassine aethiopica* Thunb.	Used by Zulus to drench worm-infested calves (Watt and Breyer-Brandwijk 1962)	Milk or whey bark infusions		
Celastraceae	*Cassine transvaalensis* (Burtt Davy) Codd	Diarhoea (van der Merwe et al. 2001)	Bark		

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Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Celastraceae	*Maytenus heterophylla* (Eckl. and Zeyh.) N.K.B.Robson	Administered by Zulus to stock animals for diarrhoea (Watt and Breyer-Brandwijk 1962)	Bark and leaf infusions	Dulcitol, a spermidine alkaloid, celacinnine, triterpenoids, maytansine (Hutchings et al. 1996)	
Celastraceae	*Mystroxylon aethiopicum* (Thunb.) Loes.	Heartwater in cattle, worms in calves, intestinal parasites (Dold and Cocks 2001)	Bark		
Chenopodiaceae	*Chenopodium album* L.	Decoctions made from plants mixed with *C. ambrosioides* administered to goats and sheep for anaemia (Hutchings et al. 1996)	Unspecified	Hydrocyanic acid, potassium oxalate, ascorbic acid, sitosterol, oleanic acid (Watt and Breyer-Brandwijk 1962; Hutchings et al. 1996)	
Chenopodiaceae	*Chenopodium ambrosioides* L.	Decoctions made from plants mixed with *C. album* administered to goats and sheep for anaemia (Hutchings et al. 1996)	Unspecified	Saponins (Watt and Breyer-Brandwijk 1962) flavonoids, quercetin, oxalic, malic and succinic acids, triterpenoid glycosides, chenopodoside A and B, amino acids, ascaridole (Hutchings et al. 1996)	
Colchicaceae	*Gloriosa superba* L.	Used to kill lice, for skin eruptions, tick infections and screw-worm on cattle (Gerstner 1939; Roberts 1990)	Corms	Colchicine, chelidonic acid various alkaloids and other constituents (Hutchings et al. 1996)	
Combretaceae	*Combretum caffrum* (Eckl. and Zeyh.) Kuntze	Conjunctivitis (Masika et al. 2000)	Drops from squeezed leaves used		Antibacterial, antifungal (Masika and Afolayan 2002)
Combretaceae	*Combretum erythrophyllum* (Burch.) Sond.	Small doses administered as fattening tonics to dogs (Watt and Breyer-Brandwijk 1962)	Roots		

Combretaceae	*Combretum paniculatum* Vent.	Fertility problems (Luseba and van der Merwe 2006)	Root bark		
Combretaceae	*Terminalia sericea* Burch. ex DC.	Wounds (Luseba and van der Merwe 2006); diarrhoea (van der Merwe et al. 2001)	Leaves, roots		
Convolvulaceae	*Seddera sufruticosa* Hallier f.	Fractures (van der Merwe et al. 2001)	Roots		
Cornaceae	*Curtisia dentata* (Burm. F.) C.A.Sm.	Heartwater in cows (Dold and Cocks 2001)	Bark		
Cucurbitaceae	*Cucumis africanus* L. f.	Used as animal medicines by the Xhosa (Hutchings et al. 1996)	Unspecified	Toxic cucurbitacins (Hutchings et al. 1996)	
Dioscoreaceae	*Dioscorea dregeana* (Kunth) Dur. and Schinz	Sores and wounds in animals and humans by Xhosa (Watt and Breyer-Brandwijk 1962)	Water heated in scooped out tuber	An alkaloid and organic acids (Watt and Breyer-Brandwijk 1962)	
Dioscoreaceae	*Dioscorea sylvatica* (Kunth) Eckl.	Swollen udders and uterine problems in cows (Watt and Breyer-Brandwijk 1962)	Lotions from boiled crushed inner parts of tubers	Diosgenin (Watt and Breyer-Brandwijk 1962)	
Dracaenaceae	*Sansevieria hyacinthoides* (L.) Druce	Fresh leaf sap applied to eyes of sheep and goats for conjunctivitis (Dold and Cocks 2001)	Leaf sap		
Ebenaceae	*Diospyros mespiliformis* Hochst. Ex A. DC.	For milk production (Luseba and van der Merwe 2006)	Bark		
Euphorbiaceae	*Clutia pulchella* L.	Drenches for griping pains in calves (Hutchings et al. 1996)	Milk infusions of leaves, stems and roots		
Euphorbiaceae	*Croton gratissimus* Burch. var. *gratissimus*	Pneumonia, tonic, fertility enhancement (van der Merwe et al. 2001)	Leaves, roots		

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Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Euphorbiaceae	*Euphorbia cooperi* N.E.Br. ex A.Berger	Blackquarter (Luseba and van der Merwe 2006)	Aerial parts		
Euphorbiaceae	*Jatropha curcas* L.	Drench for constipation in cattle and goats (Luseba and van der Merwe 2006)	Seeds		
Euphorbiaceae	*Jatropha zeyheri* Sond.	General ailments, diarrhoea (Luseba and van der Merwe 2006)	Roots		Antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Euphorbiaceae	*Phyllanthus burchellii* Müll.Arg. and *P. parvulus* Sond.	Eye infections (van der Merwe et al. 2001)	Aerial parts		
Euphorbiaceae	*Ricinus communis* L.	Administered as a purgative to calves refusing to suckle (Hutchings et al. 1996); constipation, internal parasites (van der Merwe et al. 2001)	Powdered seed	Seeds contain a fixed oil, ricin, lipases and ricinine (Trease and Evans 1983).	Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Euphorbiaceae	*Spirostachys abbrevia* Sond.	Sap applied to cattle sores to kill maggots (Hutchings et al. 1996); sweating sickness (van der Merwe et al. 2001)	Sap, wood		
Euphorbiaceae	*Synadenium cupulare* (Boiss.) L.C. Wheeler	Eye infection, blackquarter (Luseba and van der Merwe 2006)	Milky latex		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)

Fabaceae	*Acacia decurrens* Willd.	Hastens oestrus (Masika et al. 2000)	Bark decoction		
Fabaceae	*Acacia karroo* Hayne	Diarrhoea in goats, intestinal parasites in goats, sheep, poultry and pigs (Dold and Cocks 2001); fractures and diarrhoea (van der Merwe et al. 2001)	Bark, leaves		
Fabaceae	*Acacia tortilis* (Forssk.) Hayne	Diarrhoea (van der Merwe et al. 2001)	Branch tips		
Fabaceae	*Adenopodia spicata* (E. Mey.) Presl	Powdered roots used by Zulus to fatten goats (Hutchings et al. 1996); Mfengu use bark for colds in horses (Watt and Breyer-Brandwijk 1962)	Roots, bark	Saponins (Watt and Breyer-Brandwijk 1962)	
Fabaceae	*Calpurnia aurea* (Ait.) Benth.	Zulus use plant to destroy maggots in sores (Bryant 1966)	Unspecified parts	Alkaloids (Hutchings et al. 1996)	
Fabaceae	*Calpurnia villosa* Harv.	The Sotho use plant infusions topically on maggot-infested sores on cattle (Gerstner 1939)	Unspecified parts	The alkaloid oroboidine (Hutchings et al. 1996)	
Fabaceae	*Cassia abbreviata* Oliv.	Drench for worm infestations (Luseba and van der Merwe 2006)	Bark		
Fabaceae	*Elephantorrhiza elephantina* (Burch.) Skeels	The Xhosa use roots for diarrhoea and dysentery in cattle, horses and humans (Watt and Breyer-Brandwijk 1962), root given to cows for mange (Dold and Cocks 2001); heartwater, blackquarter, appetite stimulant or tonic (Luseba and van der Merwe 2006); diarrhoea, heartwater, coughing, pneumonia (van der Merwe et al. 2001)	Roots, aerial parts and bulb	Tannin (Watt and Breyer-Brandwijk 1962)	Anti-rickettsial (Naidoo et al. 2006); anti-babesial (Naidoo et al. 2005)
Fabaceae	*Erythrophleum lasianthum* Corbishley	Lung sickness in cattle and abortions in dogs (Hutchings et al. 1996)	Bark	Seeds and bark contain erythrophleine (Watt and Breyer-Brandwijk 1962)	

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Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Fabaceae	*Indigofera frutescens* L. f.	Anthelmintics in animals and humans, especially roundworm (Watt and Breyer-Brandwijk 1962)	Root bark decoctions		
Fabaceae	*Indigofera sessilifolia* DC.	Diarrhoea in calves (Dold and Cocks 2001)	Roots		
Fabaceae	*Macrotyloma axillare* (E. Mey.) Verdc.	Administered to cows with swollen udders after calving (Hulme 1954)	Warm water leaf and stalk infusions		
Fabaceae	*Peltophorum africanum* Sond.	Tonic, diarrhoea (van der Merwe et al. 2001)	Bark, root bark		Antibacterial, antioxidant, anthelmintic (Bizimenyera et al. 2005, 2006a, b)
Fabaceae	*Pterocarpus angolensis* DC.	General illness, gallsickness, intestinal worms, blackquarter (Luseba and van der Merwe 2006)	Bark		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Fabaceae	*Schotia brachypetala* Sond.	Infectious diseases in cattle (van der Merwe, pers. comm.)			Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Fabaceae	*Schotia latifolia* Jacq.	Redwater in cattle (Dold and Cocks 2001)	Bark decoction		Antibacterial, antifungal (Masika and Afolayan 2002)

Fabaceae	*Senna italica* Mill.	Diarrhoea and gallsickness (Luseba and van der Merwe 2006); gallsickness, intestinal diseases, heartwater, anthrax, pneumonia (van der Merwe et al. 2001)	Bark, roots		
Fabaceae	*Tephrosia kraussiana* Meisn.	Plants used by Zulus for protecting cattle against quarter-evil and other diseases (Doke and Vilakazi 1972)	Unspecified parts	Roots may contain a saponin (Watt and Breyer-Brandwijk, 1962)	
Fabaceae	*Tephrosia macropoda* (E. Mey.) Harv.	Roots and seeds used for killing vermin on animals and humans (Gerstner 1941); leaf extracts used as anthelmintics for cattle (Bryant 1966)	Roots, seeds, leaves	Roots contain toxicarol and deguelin (Watt and Breyer-Brandwijk 1962)	
Geraniaceae	*Monsonia emarginata* (L. f.) L'Hérit	Stomach ailments in calves, lambs and humans (Watt and Breyer-Brandwijk 1962)	Unspecified parts	Phloroglucin tannin (Watt and Breyer-Brandwijk 1962)	
Geraniaceae	*Pelargonium luridum* (Andr.) Sweet	Administered to sick calves (Hutchings et al. 1996)	Leaf infusions	Coumarins in roots (Wagner and Bladt 1975)	
Geraniaceae	*Pelargonium reniforme* Curtis	Diarrhoea in goats and cows, heartwater in cattle, liver disorders in cattle and sheep (Dold and Cocks 2001)	Root decoction		
Geraniaceae	*Pelargonium sidoides* DC.	Used as anthelmintics for calves with *Ziziphus zeyheriana* Sond. (Watt and Breyer-Brandwijk 1962)	Decoctions of unspecified parts	Coumarins in roots (Wagner and Bladt 1975)	
Gesneriaceae	*Streptocarpus prolixus* C.B. Cl.	Administered by the Zulus as purgatives to cows (Hulme 1954)	Cold water leaf infusions		
Gunneraceae	*Gunnera perpensa* L.	Used to facilitate expulsion of afterbirth in animals and women (Gerstner 1939)	Roots	Bitter principle, celastrin (Watt and Breyer-Brandwijk 1962)	

(continued)

Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Hyacinthaceae	*Albuca* sp.	Purgative and vermifuge for animals and humans (Gerstner 1938)	Unspecified		
Hyacinthaceae	*Ledebouria cooperi* (Hook. F.) Jessop	Administered to cows to ensure a succession of calves of the same gender (Watt and Breyer-Brandwijk 1962)	Unspecified		
Hyacinthaceae	*Ledebouria revoluta* (L. f.) Jessop	Gallsickness in animals by the Xhosa (Watt and Breyer-Brandwijk 1962); bulb infusion for diarrhoea in goats, leaf decoction for gallsickness (Dold and Cocks 2001)	Bulbs, leaves		
Hyacinthaceae	*Scilla natalensis* Planch.	Administered to cattle with lung sickness (Hutchings et al. 1996)	Unspecified		
Hyacinthaceae	*Scilla nervosa* (Burch.) Jessop	Used as purges for calves (Gerstner 1941)	Unspecified		
Hyacinthaceae	*Urginea altissima* (L. f.) Baker	Intestinal parasites in cattle, retained afterbirth (Dold and Cocks 2001)	Bulb decoction		
Hyacinthaceae	*Urginea physodes* (Jacq.) Bak.	'Itch' in goats (Gerstner 1941)	Unspecified		
Htacinthaceae	*Urginea sanguinea* Schinz	General ailments, intestinal diseases, internal parasites, gallsickness, heartwater, redwater, sores, retained placenta (van der Merwe et al. 2001)	Bulbs		Anti-babesial (Naidoo et al. 2005)
Hypoxidaceae	*Hypoxis hemerocallidea* Fisch. and C.A. Mey. [and *Hypoxis rigidula* Baker]	Fertility enhancement, general ailments, heartwater, abortion (van der Merwe et al. 2001)	Corms		

Icacinaceae	*Apodytes dimidiata* E. Mey. Ex Arn.	Purgatives for calves (Gerstner 1938); worms in cattle (Hutchings et al. 1996)	Bark, leaves		
Iridaceae	*Crocosmia paniculata* (Klatt) Goldbl..	Used for bovine diarrhoea by the Sotho (Watt and Breyer-Brandwijk 1962)	Unspecified		
Iridaceae	*Dietes iridioides* (L.) Sweet ex Klatt	Tonics for goats (Hulme 1954); used by the Xhosa to prevent or treat stomach ailments in goats and sheep (Hutchings and Johnson 1986)	Ground rhizomes		
Iridaceae	*Watsonia densiflora* Bak.	Diarrhoea in calves by the Sotho (Watt and Breyer-Brandwijk 1962)			
Lamiaceae	*Leonotis leonurus* (L.) R. Br.	Pounded roots and leaves are added to drinking water to prevent sickness in poultry and are used for gallsickness in cattle (Hulme 1954); eye inflammation (Masika et al. 2000)	Roots, leaves, drops used from squeezed leaf for eyes	Volatile oil and diterpenoids (labdane type lactones) for example marrubin (Dictionary of Natural Products 1996)	
Lamiaceae	*Leonotis ocymifolia* (Burm. F.) Iwarsson	Pounded roots and leaves are added to drinking water to prevent sickness in poultry and are used for gallsickness in cattle (Hulme 1954)	Roots, leaves		
Lamiaceae	*Leucas capensis* (Benth.) Engl.	Gallsickness in stock (Dold and Cocks 2001)	Leaves		
Lamiaceae	*Marrubium vulgare* L.	Gallsickness in stock (Dold and Cocks 2001)	Leaves		
Lamiaceae	*Plectranthus laxiflorus* Benth.	Drenches for animals (Watt and Breyer-Brandwijk 1962)	Powdered aerial parts		
Lamiaceae	*Tetradenia riparia*	Used for gallsickness and fevers in cattle (Hutchings et al. 1996)	Leaves	A diterpene diol, ibozol, and related diterpenoids, large amounts of α-pyrones (Dictionary of Natural Products 1996)	

(continued)

Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Lamiaceae	*Teucrium africanum* Thunb.	Gallsickness in cattle, heartwater in goats and sheep, bloat in goats, anthrax (Dold and Cocks 2001)	Leaves		
Loganiaceae	*Strychnos decussata* (Pappe)	Roundworm in cows (Dold and Cocks 2001)	Bark infusion		
Loganiaceae	*Strychnos henningsii* Gilg.	Heartwater and diarrhoea in cattle (Dold and Cocks 2001)	Bark infusion		
Malvaceae	*Hibiscus malacospermus* E.Mey. ex Harv. and Sond.	Retained placenta, intestinal worms (Masika et al. 2000)	Root decoction		
Melianthaceae	*Bersama tysoniana* Oliv.	Used by the Xhosa for gallsickness in cattle (Watt and Breyer-Brandwijk 1962)	Bark decoctions		
Moraceae	*Ficus ingens* (Miq.) Miq.	Administered to cows to increase milk production by Zulus (Watt and Breyer-Brandwijk 1962) and Vhavenda (Mabogo 1990)	Bark decoctions	Tannin (Watt and Breyer-Brandwijk 1962)	
Moraceae	*Ficus sur* Forssk.	Zulus use leaf and bark infusions as bovine galactagogues (Hutchings et al. 1996); Vhavenda use root decoctions for retained placenta in cows (Watt and Breyer-Brandwijk 1962)	Leaves, bark, roots	Bark may contain tannin (Hutchings et al. 1996)	
Myrsinaceae	*Rapanea melanophloeos* (L.) Mez	Heartwater in cows (Dold and Cocks 2001)	Bark		
Myrtaceae	*Heteropyxis natalensis* Harv.	Drench for stock animals (Watt and Breyer-Brandwijk 1962)	Powdered leaves	Essential oils from ground dried leaves contain many constituents (Hutchings et al. 1996)	

Olacaceae	*Ximenia americana* L. var. *microphylla*	Internal parasites (van der Merwe et al. 2001)	Roots		
Oleaceae	*Olea europaea* L.	Leaves used for endometritis and vaginitis in cows, bark infusion for diarrhoea in goats, gallsickness in cattle, eye lotion for animals and humans (Dold and Cocks 2001)	Leaves, bark		
Orchidaceae	*Eulophia speciosa* (R. Br. Ex Lindl.) H. Bol.	Emetics for animals and humans (Gerstner 1941)	Root infusions		
Pedaliaceae	*Dicerocaryum eriocarpum* (Dcne.) J.Abels [and *D. senecioides* (Kltzsch.) J.Abels]	Dystocia, drench for retained placenta (Luseba and van der Merwe 2006; van der Merwe et al. 2001)	Aerial parts, roots, whole plant		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Pedaliaceae	*Harpagophytum procumbens* DC.	Retained placenta (van der Merwe et al. 2001)	Fruit		
Poaceae	*Cymbopogon marginatus* (Steud.) Stapf ex Burtt Davy	Gall sickness in animals (Jacot Guillarmod 1971)	Unspecified		
Phytolaccaceae	*Phytolacca heptandra* Retz.	The Xhosa use roots for lung sickness in cattle (Watt and Breyer-Brandwijk 1962)	Roots		
Phytolaccaceae	*Phytolacca octandra* L.	Lung sickness in cattle (Watt and Breyer-Brandwijk 1962)	Root infusions	Triterpenoid saponins, known as yiamoloside B (Moreno and Rodriguez 1981)	
Pittosporaceae	*Pittosporum viridiflorum* Sims	Gallsickness (Masika et al. 2000)	Bark decoction		

(continued)

Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Plumbaginaceae	*Plumbago auriculata* Lam.	Diarrhoea in cows (Dold and Cocks 2001)	Roots		
Plumbaginaceae	*Plumbago zeylanica* L.	Pneumonia (van der Merwe et al. 2001)	Roots		
Podocarpaceae	*Podocarpus falcatus* (Thunb.) R. Br. Ex Mirb.	Distemper in dogs (Dold and Cocks 2001)	Leaf decoction		
Podocarpaceae	*Podocarpus latifolius* (Thunb.) R. Br. Ex Mirb.	Distemper in dogs, gallsickness in cattle (Dold and Cocks 2001; Masika et al. 2000)	Leaf, root or bark decoction		
Polygalaceae	*Polygala hottentotta* Presl	Anthrax (Jacot Guillarmod 1971)	Unspecified parts		
Polygonaceae	*Emex australis* Steinh.	Threadworm in horses (Hutchings et al. 1996)	Leaf decoctions	Anthraquinones (Watt and Breyer-Brandwijk 1962)	
Polygonaceae	*Rumex lanceolatus* Thunb.	Used with *Euclea coriacea* A. DC. To treat gallsickness in stock animals (Jacot Guillarmod 1971)	Unspecified parts	Chrysophanic acid, emodin and volatile oil (Watt and Breyer-Brandwijk 1962)	
Proteaceaae	*Protea caffra* Meisn.	Enemas given to calves with bloody diarrhoea (Hutchings et al. 1996)	Root bark decoctions		
Proteaceae	*Protea welwitschii* Engl.	Dysentery and diarrhoea in calves and humans (Watt and Breyer-Brandwijk 1962)	Decorticated root infusions		
Ptaeroxylaceae	*Ptaeroxylon obliquum* (Thunb.) Radlk.	Anthrax remedy, for ticks in cattle (Hutchings et al. 1996)	Wood	Powdered wood is irritating and induces sneezing (Hutchings et al. 1996); timber has high oil and resin content (Watt and Breyer-Brandwijk 1962)	

Ranuncluaceae	*Clematis brachiata* Thunb.	Vermifuge and for bots in horses (Hutchings et al. 1996)	Infusions from shoots and leaves	Contains anemonol (Watt and Breyer-Brandwijk 1962)	
Rhamnaceae	*Berkhemia zeyheri* (Sond.) Grubov	Infectious diseases in cattle (van der Merwe, pers. comm.)	Bark		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al., 2007)
Rhamnaceae	*Ziziphus mucronata* Willd.	Fertility enhancement, sores, burns (van der Merwe et al. 2001)	Roots, leaves		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Rhamnaceae	*Ziziphus zeyheriana* Sond.	Diarrhoea, internal parasites, general ailments (van der Merwe et al. 2001)	Root-stock		
Rosaceae	*Prunus persica* (L.) Batsch.	Leaf decoction for diarrhoea in lambs and kid goats, roots for broken bones (Dold and Cocks 2001)	Leaf decoctions, roots		
Rubiaceae	*Pentanisia prunelloides* (Klotzsch ex Eckl. and Zeyh.) Walp. subsp. *prunelloides*	Used by Xhosa to aid expulsion of retained animal or human placenta (Watt and Breyer-Brandwijk 1962)	Root decoctions		
Rutaceae	*Clausena anisata* (Willd.) Hook. F. Ex Benth.	Dysentery in cattle (Hutchings et al. 1996)	Bark infusions	Terpenoid hydrocarcbons, alkaloids, coumarins and many other compounds (Hutchings et al. 1996)	

(continued)

Table 10.1 (continued)

Rutaceae	*Zanthoxylum capense* (Thunb.) Harv.	Gallsickness in stock (Dold and Cocks 2001)	Leaves, root decoction		
Rutaceae	*Zanthoxylum davyi* (Verdoorn) Waterm.	Administered as tonics to animals and humans (Hutchings et al. 1996)	Root decoctions		
Salicaceae	*Salix* L. spp.	Retained placenta (Masika et al. 2000)	Decoction or infusion of unspecified parts		Antibacterial, antifungal (Masika and Afolayan 2002)
Salvadoraceae	*Azima tetracantha* Lam.	Dystocia in cows (Dold and Cocks 2001)	Root		
Sapindaceae	*Hippobromus pauciflorus* (L. f.) Radlk.	Leaf and root infusions used to clear mucus from noses of sheep and goats (Watt and Breyer-Brandwijk 1962); root infusions given to stock animals with coughs (Hutchings et al. 1996); leaf sap used for inflamed eyes in animals and humans (Watt and Breyer-Brandwijk 1962; Masika et al. 2000); bark used for heartwater and diarrhoea in cattle (Dold and Cocks 2001)	Leaf and root infusions or decoctions, leaf sap, bark	Resinous and oily substances in wood and leaves (Watt and Breyer-Brandwijk 1962)	Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Sapindaceae	*Pappea capensis* Eckl. and Zeyh.	Used medicinally by Zulus for calves (Gerstner 1939)	Unspecified parts		
Sapotaceae	*Englerophytum magalismontanum* Krause	Fertility enhancement (van der Merwe et al. 2001)	Roots		

		tonics to calves and goats (Hutchings et al. 1996); Xhosa use bark for gallsickness in stock (Watt and Breyer-Brandwijk 1962); bark decoction used for redwater in cattle (Dold and Cocks 2001)	parts; bark	leucanthocyanidins from bark (Hutchings et al. 1996)	
Solanaceae	*Datura stramonium* L.	Powdered leaves are applied by Zulus to animal and human bruises and wounds to draw out inflammation and pus (Watt and Breyer-Brandwijk 1962)	Powdered leaves	Alkaloids including hyoscyamine and hyoscine (Oliver-Bever 1986)	
Solanaceae	*Nicotiana tabacum* L.	Eye infections (van der Merwe et al. 2001)	Leaves		
Solanaceae	*Solanum aculeastrum* Dun.	Ringworm in cattle and horses and also for anthrax (Hutchings et al. 1996)	Fruit	Solanine (Watt and Breyer-Brandwijk 1962)	
Solanaceae	*Solanum capense* L.	Fruit pulp used by Xhosa for warts and ringworm in animals and humans, fruit sap for sores, distemper and sore eyes in dogs (Watt and Breyer-Brandwijk 1962)	Fruit		

(continued)

Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Solanaceae	*Solanum hermannii* Dun.	Fruit sap and leaf paste used for sores on sheep and horses by Xhosa and Sotho (Watt and Breyer-Brandwijk 1962)	Fruit, leaves	Solanin, solanidine, azosolanidin, quinhydrone solasonine, solasodine, solasodamine from fruit (Watt and Breyer-Brandwijk 1962)	
Solanaceae	*Solanum incanum* L.	Sores (van der Merwe et al. 2001)	Roots		
Solanaceace	*Solanum panduriforme* E. Mey.	Diarrhoea (van der Merwe et al. 2001)	Fruit sap		
Solanaceae	*Solanum lichtensteinii* Willd.	Respiratory problems (Luseba and van der Merwe 2006)	Aerial parts		
Solanaceae	*Solanum mauritianum* Scop.	Dystocia in cows (Dold and Cocks 2001)	Roots		
Solanaceae	*Withania somnifera* (L.) Dun.	Used to stimulate milk production in cows (Gerstner 1941); roots used for black gallsickness in cattle (Hutchings et al. 1996); diarrhoea (van der Merwe et al. 2001)	Unspecified parts, roots	Many compounds including choline, tropanaol, glycowithanolides, withanolides, withaferine and withasomnine (Hutchings et al. 1996 and references therein)	
Sterculiaceae	*Dombeya rotundifolia* (Hochst.) Planch.	Newcastle disease in chickens (Luseba and van der Merwe 2006); infectious diseases in cattle (van der Merwe, pers. comm.)	Leaves and flowers		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Thymelaeaceae	*Gnidia capitata* L.f.	Heartwater in cows, anthrax (Dold and Cocks 2001)	Root decoction		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Thymelaeaceae	*Gnidia kraussiana* Meisn.	Preparations injected near the site of fractured limbs of stock animals by the Sotho (Jacot Guillarmod 1971)	Unspecified parts	Flavone heteroside from roots, toxic diterpenoid fraction, polysacchardies daphnane orthoesters (Hutchings et al. 1996)	

Tiliaceae	*Grewia flava* DC.	Fertility enhancement (van der Merwe et al. 2001)	Roots		
Tiliaceae	*Grewia occidentalis* L.f.	Gallsickness in stock (Dold and Cocks 2001)	Leaves		
Tiliaceae	*Triumfetta sonderi* L.	Retained placenta (van der Merwe et al. 2001)	Root bark		
Typhaceae	*Typha capensis* (Rohrb.) N.E. Br.	Decoctions taken or applied externally to aid expulsion of afterbirth in animals and humans (Roberts 1990)	Unspecified parts	Quercetin 3′dimethyl ether 4′glucoside from leaf (Hutchings et al. 1996)	
Urticaceae	*Pouzolzia mixta* Solms	Retained placenta, bloat, vaginal discharge (van der Merwe et al. 2001)	Roots, leaves, stems		Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007)
Verbenaceae	*Clerodendrum glabrum* E. Mey.	Unspecified parts are used as purgatives for calves (Hutchings et al. 1996); The Sotho and Swazi use topical leaf decoctions to prevent parasites developing in animal wounds (Watt and Breyer-Brandwijk 1962). The Tswana use leaf infusions and bark scrapings as anthelmintics for dogs, calves and donkeys (Roberts 1990)	Leaves, bark		
Verbenaceae	*Lantana rugosa* Thunb.	Pastes or infusions used for animal and human eye complaints (Watt and Breyer-Brandwijk 1962)	Leaves	Volatile oil and the alkaloid lantanin (Watt and Breyer-Brandwijk 1962).	
Verbenaceae	*Vitex zeyheri* Sond. ex Schauer	Eye infections (van der Merwe et al. 2001)	Leaves		

(continued)

Table 10.1 (continued)

Family	Species	Indication	Plant part used	Chemical constituents	Screened for activity
Vitaceae	*Cissus quadrangularis* L.	Used by Zulus as a drench for sick horses (Watt and Breyer-Brandwijk 1962), aerial parts used as poultice for wounds, lumpy skin disease and as tick repellent (Luseba and van der Merwe 2006)	Aerial parts	A steroidal mixture and triterpenoids (Hutchings et al. 1996)	Antibacterial, anthelmintic, brine shrimp toxicity (McGaw et al. 2007); antibacterial, anti-inflammatory, mutagenic (Luseba et al. 2007)
Vitaceae	*Cyphostemma natalitium* (Szyszyl.) J. V. D. Merwe	Used by Zulus for colic in cattle (Gerstner 1939)			
Vitaceae	*Rhoicissus digitata* (L. f.) Gilg and Brandt	Cattle diseases (Hutchings et al. 1996)	Tubers		
Vitaceae	*Rhoicissus tomentosa* (Lam.) Wild and Drum.	Anthelmintics for calves (Watt and Breyer-Brandwijk 1962)	Roots		
Vitaceae	*Rhoicissus tridentata* (L. f.) Wild and Drum.	Cattle diseases (Pujol 1990), diarrhoea in goats and sheep (Dold and Cocks 2001); heartwater, redwater, internal parasites, general ailments, abortion (van der Merwe et al. 2001)	Tubers		Anti-babesial (Naidoo et al. 2005)
Zamiaceae	*Stangeria eriopus* (Kunze) Baill.	Internal parasites in livestock (Dold and Cocks 2001)	Rootstock		
Zingiberaceae	*Siphonochilus aethiopicus* (Schweinf.) B.L. Burtt	Administered to horses as prophylactics against horse sickness (Watt and Breyer-Brandwijk 1962)	Rhizome infusions	Volatile oil with a characteristic sesquiterpenoid, α-terpineol and other monoterpenoids (Van Wyk et al. 1997)	
Zygophyllaceae	*Tribulus terrestris* L.	Retained placenta, bloat (van der Merwe et al. 2001)	Whole plant, aerial parts		

semi-structured interviews. Time should be structured to ensure team interaction as part of an iterative process.

The use of traditional remedies to treat animal diseases is widely used amongst small-scale farmers of different ethnic groups including Tswana, Tsonga, Xhosa and Zulu, largely because of low cost, convenience and ease of administration (McGaw and Eloff 2008). Since information about traditional uses of many South African plants have been documented in only several books and journal articles, the review by McGaw and Eloff (2008) focused on the compilation of a complete systematic ethnobotanical record as EVM knowledge was rapidly disappearing and extinction was a threat as the plants may be over exploited.

It was found in the 2008 review that about 200 plant species from over 80 families were used as ethnoveterinary medicine to treat common diseases such as retained placenta, diarrhoea, gallsickness, fractures, eye inflammation, general unwellness, fertility problems, gastrointestinal ailments, heartwater, helminthosis, coughing, redwater and reduction of ticks in cattle, goats, sheep and poultry (McGaw and Eloff 2008).

The methods of preparation as well as application and dosages are critical factors to account for when evaluating a traditional remedy. According to Van der Merwe et al. (2001) it is believed that the small amounts of plant material used in medicines is the reason for the scarcity of reported toxic effects. McGaw and Eloff (2008) recommended that further research be done to optimise dosing and concentrations of EVM remedies.

10.3 Biological Activity of EVM Plants Studied Up to 2008

Out of the 200 plant species that were recorded in the study of McGaw and Eloff (2008), only 27 species had been screened for biological activity in targeted assays relating to ethnoveterinary use. Plants that were tested for antibacterial activity were 25, anthelmintic 17, brine shrimp toxicity 15, anti-inflammation 10, mutagenicity 7, antifungal 3 and anti-babesial were 3. In ethnoveterinary practices, water is the most commonly used solvent to prepare traditional medicine but in terms of the laboratory bioassays, organic solvents such as methanol, ethanol, dichloromethane, acetone, hexane and chloroform are commonly used to prepare the plant extracts.

Antibacterial activity seems to be the most commonly studied biological activity as 25 out of 27 plant species were tested for antibacterial activity, and the microplate serial dilution technique by Eloff (1998) was the most used technique to determine antibacterial and antifungal activity (McGaw and Eloff 2008). *Escherichia coli*, *Enterococcus faecalis*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* are commonly used bacterial strains as they are recommended by the National Committee for Clinical Laboratory Standards. In antifungal assays, *Candida albicans, Cryptococcus neoformans* and *Aspergillus fumigatus* were the most popular strains (McGaw and Eloff 2008). The anti-babesial in vitro assay was done using the cell culture based anti-babesial test exposing *Babesia caballi* cultures to plant

extracts, and the acetone extract of *Elephantorrhiza elephantina* rhizome was active against *Babesia caballi* (Naidoo et al. 2005). An in vitro *Ehrlichia ruminantium* culture system was used to test the anti-rickettsial activity of plant extracts and again *Elephantorrhiza elephantina* and *Aloe marlothii* acetone extracts were active (Naidoo et al. 2006).

10.4 Updated Information on Ethnoveterinary Use of Plants (2008–2018)

In Table 10.2, a total of 83 plant species belonging to 47 families were identified from studies on ethnoveterinary surveys published between 2008 and 2018. The majority of surveys done and plants identified were amongst the Xhosa ethnic group of the Eastern Cape Province. Since 2008, relatively few surveys have been done to obtain ethnoveterinary knowledge amongst different communities of various ethnic groups. In a survey done by Luseba and Tshisikhawe (2013), it was found that over 33 plant species belonging to over 21 families were used as ethnoveterinary medicine, with the Fabaceae family having more plant species. This is likely to be mostly owing to the large size of the family. The survey was done in the Vhembe (Venda speaking) region in Limpopo province and 37 individuals were interviewed. In another survey done by Kambizi (2016), it was found that the communities of Pondoland (Xhosa-speaking) also use indigenous plant species for ethnoveterinary purposes. This survey revealed that 23 plants from 18 families were used to treat livestock. Farmers of the Amatola Basin (Xhosa-speaking) in the Eastern Cape province indicated that wounds and myiasis were serious health problems in cattle and resulted in a decrease in animal production, which is responsible for severe economic losses (Soyelu and Masika 2009).

Intestinal parasites are a major problem in animals worldwide, causing heavy production losses in animals. They are commonly found in developing countries, mainly because of poor management practices and inadequate control measures, in association with warm temperatures. It was discovered that in most ethnoveterinary surveys, medicinal plants are commonly used for the control of these parasites (Maphosa and Masika 2010). It was found that 28 plant species from 20 families were used as ethnoveterinary medicine to treat gastro-intestinal parasites in goats in a survey done in the Eastern Cape province (Maphosa and Masika 2010). Thirty individuals were interviewed, and similar plant species were also identified in a similar survey including both intestinal and external parasites done by Sanhokwe et al. (2016) in Kwezi and Ntambethemba villages in the Eastern Cape Province. In another survey done by Mwale and Masika (2009), it was found that most of the poultry farmers interviewed used over nine plant species to treat gastro-intestinal parasites on their chickens. The main medicinal plant used for controlling these parasites in chickens was *Aloe ferox*. Again, *Aloe ferox* was the most commonly used plant along with *Prunus persica* and *Phytolacca heptandra* in a survey done by

Table 10.2 Plant species reported in ethnoveterinary studies (2008–2018)

Family	Species	Indication, plant part, preparation and administration	Screened for activity
Agapanthaceae	*Agapanthus praecox* Willd.	Intestinal parasites in goats and black quarter in cattle. Leaves are ground, soaked in water overnight and 500 ml dosed for goats. Roots and leaves are crushed and soaked with water and administered orally (Maphosa and Masika 2010; Sanhokwe et al. 2016; Mthi et al. 2018)	Genotoxicity and anti-genotoxicity (Makhuvele et al. 2018)
Amaryllidaceae	*Clivia* spp.	Root infusion used for stomach problems (Maphosa and Masika 2010)	
Anacardiaceae	*Harpephyllum caffrum* Bernh.	Bark decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
	Searsia lancea (L.f.) F.A.Barkley	Leaves are boiled, and 1 l given to adults and 500 ml to calves for lumpy skin disease in cattle (Luseba and Tshisikhawe 2013)	Antibacterial screening, synergy studies and phenolic content (Vambe et al. 2018)
Apiaceae	*Alepidea amatymbica* Eckl. & Zeyh.	Bulb infusion used to treat heartwater and skin diseases (Kambizi 2016)	
	Centella asiatica (L.) Urb.	Plant (tuber and root) is cut and boiled, cooled and given to chickens to drink for internal parasites (Mwale and Masika 2009)	
	Centella coriacea Nannf.	Decoction of chopped bark is sieved and approximately 500 mL dosed to goats for intestinal problems (Maphosa and Masika 2010; Sanhokwe et al. 2016)	
Apocynaceae	*Acokanthera oppositifolia* (Lam.) Codd	Leaves are ground, boiled, cooled and used to drench animals for intestinal and external parasites in goats and black-quarter in cattle. Dose with 1 L bottle for adults and a 300 mL bottle for young ones. For cattle, leaves are crushed with water and administered orally (Maphosa and Masika 2010; Sanhokwe et al. 2016; Mthi et al. 2018)	
	Carissa bispinosa (L.) Desf. ex Brenan	Bulb is ground and 1 L extract given to cows for calving difficulties (Luseba and Tshisikhawe 2013)	
	Xysmalobium undulatum (L.) W.T.Aiton	Plant (tuber and root) is cut and boiled, cooled and given to chickens to drink for internal parasites (Mwale and Masika 2009)	
Araliaceae	*Cussonia spicata* Thunb.	Bark is ground, soaked overnight and 300 ml dosed to goats against intestinal parasites(Maphosa and Masika 2010; Sanhokwe et al. 2016)	

(continued)

Table 10.2 (continued)

Family	Species	Indication, plant part, preparation and administration	Screened for activity
Asparagaceae	*Agave sisalana* Perrine	Leaves are cut and mixed with cold water or boiled and cooled before giving to chickens to drink for internal parasites (Mwale and Masika 2009)	
	Asparagus falcatus L.	Whole plant infusion used for constipation in cattle (Kambizi 2016)	
	Asparagus africanus Lam.	Infusion of the bulb is used for heartwater (Kambizi 2016)	
Asphodelaceae	*Aloe arborescens* Mill.	Leaf decoction used against intestinal parasites in goats (Maphosa and Masika, 2010)	Antibacterial and cytotoxicity (Sserunkuma et al. 2017)
	Aloe ferox Mill.	Leaves are crushed and juice applied to skin (mites and ticks) or mixed with drinking water to form decoctions and infusions to treat intestinal and external parasites in goats (Maphosa and Masika, 2010; Sanhokwe et al. 2016). Leaf infusion is used as a wash or applied as a dressing on wounds for wound infections in cattle (Soyelu and Masika 2009). Leaves are chopped and mixed with cold water; or mixture is boiled before giving to chickens as drinking water to treat internal parasites (Mwale and Masika 2009)	
	Aloe marlothii Berger	Broad leaves are ground, juice is squeezed in water and chickens allowed to drink for liver problems and Newcastle disease (Luseba and Tshisikhawe 2013)	
	Gasteria bicolor Haw.	Leaf infusion used for intestinal parasites in goats (Maphosa and Masika 2010)	
	Bulbine latifolia (L.F.) Spreng.	Leaves used for intestinal parasites in goats. Ground leaves are boiled and applied to skin against ticks, or drench with 1 L (Maphosa and Masika 2010; Sanhokwe et al. 2016)	
	Bulbine frutescens (L.) Willd.	Whole plant infusion used for intestinal parasites in goats (Maphosa and Masika 2010)	
	Bulbine abyssinica	Leaf decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
Asteraceae	*Haplocarpha scaposa* Harv.	Root decoction used as a wash for wound infections in cattle (Soyelu and Masika 2009)	

	Helichrysum splendidum (Thunb.) Less.	Leaves are burnt to ash and smoke will drive away external parasites; ash is placed in incubators where there are incubating hens (Mwale and Masika 2009)	
	Tagetes minuta L.	Mix the leaves with periperi (*Capsicum frutescence*), grind and apply the mixture to control ticks on cattle (Luseba and Tshisikhawe 2013). Roots are boiled, I L given to cows and 500 ml to calves for diarrhoea (Luseba and Tshisikhawe 2013). Leaves are placed where there are external parasites of chickens or in a hatchery (Mwale and Masika 2009)	
	Vernonia corymbosa (L.f.) Less	Roots are ground and mixed with water. One litre given to cows and 500 ml to young calves to treat worms (Luseba and Tshisikhawe 2013)	
Balanophoraceae	*Sarcophyte sanguinea* Sparrm.	Whole plant is crushed with water and administered orally for black quarter (Mthi et al. 2018)	
Boraginaceae	*Ehretia rigida* (Thunb.) Druce	Boil the roots; give the cow in 1 l and ½ a litre to young animals for eating problems in cattle (Luseba and Tshisikhawe 2013)	
Cannabaceae	*Trema orientalis* (L.) Blume	Leaves are ground, mixed with water and given to animals for gallsickness (Luseba and Tshisikhawe 2013)	Antibacterial, anti-inflammatory and genotoxicity (Madikizela et al. 2012)
Capparaceae	*Maerua angolensis* DC.	Leaves are ground, mixed with water and 1 L given to cows and 500 ml to calves to treat eating problems (Luseba and Tshisikhawe 2013)	
Capparidaceae	*Capparis sepiaria* L.	Root infusion used to treat intestinal parasites in goats (Maphosa and Masika 2010)	
	Cussonia spicata Thunb.	Bark infusion used to treat heartwater (Kambizi 2016)	
Celastraceae	*Elaeodendron transvaalense* (Burtt Davy) R.H.Archer	Fruits are ground, mixed with water and give 1 l to cows and 500 ml to calves for worms in cattle (Luseba and Tshisikhawe 2013)	
Clusiaceae	*Garcinia livingstonei* T.Anderson	Fresh leaf juice is squeezed into the eye of the animal for eye problems (Luseba and Tshisikhawe 2013)	
Combretaceae	*Combretum molle* R.Br. ex G.Don	A leaf infusion is administered: 1 L to cows and 500 ml to calves for gut conditions (Luseba and Tshisikhawe 2013)	

(continued)

Table 10.2 (continued)

Family	Species	Indication, plant part, preparation and administration	Screened for activity
	Terminalia sericea Burch. ex DC.	Boil roots and give the animal in 1 l, 500 ml to young ones (mix with milk) for diarrhoea. Ground roots are mixed with water and applied on ticks and wounds (Luseba and Tshisikhawe 2013)	Antiparasitic and anti-inflammatory (Nair et al. 2018)
Ebenaceae	*Diospyros lycioides* Desf.	Leaves are ground, mixed with water and applied on the affected area for ticks in cattle (Luseba and Tshisikhawe 2013	
Euphorbiaceae	*Pseudolachnostylis maprouneifoloia* Pax	Bark is ground, mixed with water and sieved; 1 l given to cows and 500 ml to calves (Luseba and Tshisikhawe 2013)	
	Synadenium cupulare (Boiss.) L.C. Wheeler	Strike with latex branch on the affected area for black quarter (Luseba and Tshisikhawe 2013). Brancj is cut and oozing latex applied on the limb to treat lumpy skin disease (Luseba and Tshisikhawe 2013)	
Fabaceae	*Acacia karroo* Hayne	Crushed leaves are used for wound infections in cattle (Soyelu and Masika 2009)	
	Bolusanthus speciosus (Bolus) Harms	Pounded roots and bulb are immersed for 12 h, and 2 l are given f or 3 days for retained placenta in cattle (Luseba and Tshisikhawe 2013)	
	Calpurnia aurea (Ait.) Benth.	Leaf infusion used as a lotion for wounds; also effective against maggot infested wounds (Soyelu and Masika 2009)	Antibacterial and cytotoxicity (Elisha et al. 2017)
	Dalbergia obovata E.Mey.	Leaves and bark are crushed and mixed with water and administered orally for paratyphoid (Mthi et al. 2018)	
	Elephantorrhiza burkei Benth.	Bulb and roots are ground, mixed with water and given to cattle for diarrhoea (Luseba and Tshisikhawe 2013)	
	Elephantorrhiza elephantina (Burch.) Skeels	Roots are ground and boiled in water for about 30 min until the water turns red. Dose 300 mL or spray the animals for mites and ticks. Bark is boiled to form a decoction and remedy is administered orally to goat for intestinal and external parasites (Maphosa and Masika 2010)	
	Erythrina caffra Thunb.	Bark infusion used to treat heartwater (Kambizi 2016)	Antibacterial, antioxidant and cytotoxicity (Dzoyem et al. 2014)

	Milletia grandis (E.Mey) Skeels	Leaves soaked in cold water and given to chickens to drink for internal parasites (Mwale and Masika 2009)	
	Pterocarpus angolensis DC.	Bark is soaked in water and 1 l given to cows and 500 ml to calves for not eating (Luseba and Tshisikhawe 2013)	
	Schotia latifolia Jacq.	Bark decoction given for intestinal parasites in goats (Maphosa and Masika 2010). Bark decoction used as a wash for wounds in cattle (Soyelu and Masika 2009)	
	Senna petersiana (Bolle) Lock	Leaves are soaked and 500 ml given to goat for general illnesses (Luseba and Tshisikhawe 2013)	
	Xanthocersis zambesiaca (Baker) Dumaz-le-Grand	Bark is ground, boiled and 1 l given to cows and 500 ml to calves for eating problems (Luseba and Tshisikhawe 2013). Bark is ground, mixed with salt and give to cattle or leaves are soaked for 12 hours and 2 l given to animals (Luseba and Tshisikhawe 2013)	
Geraniaceae	*Pelargonium reniforme* Curtis	Tuber decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
Gunneraceae	*Gunnera perpensa* L.	Tuber is crushed and boiled and 300 ml given to goats for intestinal parasites (Maphosa and Masika 2010; Sanhokwe et al. 2016). Leaves are chopped, cold water is added and given to chickens to drink for internal parasites (Mwale and Masika 2009)	Antinociceptive and anti-inflammatory (Nkomo et al. 2010)
Hyacinthaceae	*Albuca setosa* Jacq.	Tuber is crushed, boiled and dosed with a 500 ml bottle for intestinal problems in goats (Sanhokwe et al. 2016)	
Hypoxidaceae	*Hypoxis argentea* Harv. ex Baker	Tuber decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
Iridaceae	*Gladiolus dalenii* Van Geel	Fresh bulb is ground, put in a sac and juice is squeezed on infected eyes (Luseba and Tshisikhawe 2013). The stem is mixed with leaves of *Dicerocaryum eriocarpum*, crushed and given in a 1 l bottle for eating problems in animals (Luseba and Tshisikhawe 2013)	
Lamiaceae	*Clerodendrum glabrum* E.Mey.	Leaf infusion used for intestinal parasites in goats (Kambizi 2016)	

(continued)

Table 10.2 (continued)

Family	Species	Indication, plant part, preparation and administration	Screened for activity
	Teucrium trifidum Retz.	Leaf infusion used for intestinal parasites in goats (Maphosa and Masika 2010)	
	Leonotis leonurus (L.) R. Br.	Leaf decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
	Ocotea bullata (Burch.) E. Meyer in Drege	Bark decoction given to goats for intestinal parasites (Maphosa and Masika 2010)	
Loganiaceae	*Strychnos henningsii* Gilg.	Bark decoction used for intestinal parasites in goats and black quarter in cattle (Maphosa and Masika 2010; Mthi et al. 2018)	
Lauraceae	*Cassytha filiformis* L.	Stem is mixed with leaves of *Dicerocaryum erriocarpum,* crushed and boiled and 1 l given for calving difficulties (Luseba and Tshisikhawe 2013)	
Lobeliaceae	*Cyphia stramonium* N.E.Br.	Leaf infusion used for shivering endlessly (Kambizi 2016)	
Meliaceae	*Turraea obtusifolia* Hochst	Crushed leaves are applied directly on wounds (Luseba and Tshisikhawe 2013)	
Menispermaceae	*Cissampelos capensis* L.f.	Root infusion used for wounds and skin diseases (Kambizi 2016)	
Ochnaceae	*Ochna holstii* Engl.	Shoots are mixed with water and animals are allowed to drink 1 l for eating problems in cattle (Luseba and Tshisikhawe 2013)	
Olacaceae	*Ximenia americana* L.	Leaves and branches are boiled for 1 h and 1 l is given once a day for 3 days for wounds (Luseba and Tshisikhawe 2013). Aerial parts are ground and mixed with water and 1 l is given to cows for calving difficulties (Luseba and Tshisikhawe 2013)	
Oleaceae	*Olea europaea* subsp. *africana* (Mill.) P.S.Green	Bark is crushed and soaked with warm and administered orally for black quarter (Mthi et al. 2018)	
Pedaliaceae	*Dicerocaryum eriocarpum* (Decne.) Abels	Aerial parts are ground and mixed with water and given to cattle in a 1 l bottle for worms (Luseba and Tshisikhawe 2013)	
Peraceae	*Clutia pulchella* L.	Leaves applied on skin for flea reduction in chickens (Moyo and Masika 2013)	Antibacterial, anti-inflammatory and genotoxicity (Madikizela et al. 2012)

Pittosporaceae	*Pittosporum viridiflorum* Sims	Bark infusion used for intestinal parasites in goats (Maphosa and Masika 2010)	Antibacterial and cytotoxicity (Elisha et al. 2017)
Polygonaceae	*Rumex lanceolatus* Thunb.	Root decoction is used for intestinal parasites in goats (Maphosa and Masika 2010)	
Ptaeroxylaceae	*Ptaeroxylon obliquum* Thunb. Radlk.	Leaf decoction used to treat intestinal parasites in goats (Maphosa and Masika 2010)	
Rhamnaceae	*Ziziphus mucronata* Willd.	Leaf infusion used to treat intestinal parasites in goats (Maphosa and Masika 2010)	
Rosaceae	*Prunus persica* (L.) Batsch	Leaf infusion used to treat wounds in cattle (Kambizi 2016). Leaves and ground and juice squeezed and applied to wound or eyes (Luseba and Tshisikhawe 2013)	
Rubiaceae	*Cephalanthus natalensis* Oliv.	Leaves are ground with water and given to animal in 1 l bottle for eye problems (Luseba and Tshisikhawe 2013)	Antimycobacterial, anti-inflammatory and antioxidant (Aro et al. 2016)
	Coddia rudis (E.Mey. ex Harv.) Verdc.	Root infusion used to eliminate ticks (Kambizi 2016)	
	Hyperacanthus amoenus (Sims) Bridson	Fresh roots are crushed and juice is squeezed into the eye for eye problems (Luseba and Tshisikhawe 2013)	
	Rothmannia capensis Thunb.	Root decoction is administered in a 2 l bottle for eating problems in cattle (Luseba and Tshisikhawe 2013)	
Rutaceae	*Zanthoxylum capense* (Thunb.) Harv.	Root decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
Solanaceae	*Solanum incanum* L.	Fruits are ground and applied to the eyes to treat eye problems in goats, sheep and cattle; leaves are ground, mixed with water and given to the animal for eye problems (Luseba and Tshisikhawe 2013)	
Sterculiaceae	*Hermannia incana* Cav.	Decoction of whole plant used for intestinal parasites in goats (Maphosa and Masika 2010)	
Tiliaceae	*Grewia occidentalis* L.f.	Bark decoction used for intestinal parasites in goats (Maphosa and Masika 2010)	
Verbenaceae	*Lippia javanica* (Burm.f.) Spreng	Leaves are burnt to ash and smoke used to deter external parasites of chickens (Mwale and Masika 2009)	

Soyelu and Masika (2009). *Aloe ferox* is also reported to be used to treat ticks and mites by the farmers in Kwezi and Ntambethemba villages in the Eastern Cape Province (Sanhokwe et al. 2016).

In all the surveys mentioned, the most frequently used plant part was the leaves and the methods of preparation were mainly decoctions and infusions. Decoctions were the most frequently used method as this involves boiling the plant material in water to extract water soluble (polar) chemical compounds, and it could also detoxify poisonous plants depending on the type of toxins the plants contain (Maphosa and Masika 2010). Intestinal parasites were mentioned in most of the surveys, proving that they are a growing problem in most parts of the country. During the surveys, it was also found that some ethnic groups used a combination of two or more plant species during preparation to ensure that the treatment becomes effective, while other ethnic groups used single plant species (Luseba and Tshisikhawe 2013; Maphosa and Masika 2010; McGaw and Eloff 2008).

There is on some occasions a relationship between plants which are used for animal health care and plants which are used for human health care. *Hippobromus pauciflorus* (Sapindaceae) is used to treat diarrhoea in humans (Bisi-Johnson et al. 2010) while it is also used to wash wounds in animals (Soyelu and Masika 2009). The Vhembe community uses *Turraea obtustfolia* (Meliaceae) to treat wounds in animals by directly applying it on the wound (Luseba and Tshisikhawe 2013) while it is also used by the people of Pondoland to treat diarrhoea (Madikizela et al. 2012). Some plants like *Ziziphus mucronata* (Rhamnaceae) and *Bulbine abyssinica* (Asphodelaceae) are used for similar ailments such as diarrhoea and gastro-intestinal parasites (McGaw and Eloff 2008; Maphosa and Masika 2010).

Antibacterial assays may be divided into three different assays namely agar diffusion, dilution, and bioautography but from 2008 to date most studies applied the serial microdilution assay described by Eloff (1998), which includes the determination of the minimum inhibitory concentration (MIC) values of extracts against different bacterial organisms (Dzoyem et al. 2014; Elisha et al. 2016; McGaw and Eloff 2010; Sserunkuma et al. 2017). Acetone is believed to be the most suitable solvent of choice for antibacterial testing as it was found to be nontoxic to different bacterial strains at the dilutions tested during the serial broth microdilution assay (McGaw and Eloff 2010). Dzoyem et al. (2014) demonstrated this where acetone extracts of *Crotalaria capensis* had high activity against *Salmonella typhimurium*, followed by *Indigofera cylindrica* with MICs of 20 μg/mL and 40 μg/mL.

Since ethnoveterinary practitioners mostly use water as a solvent, research has also turned to using water as an extraction solvent when performing laboratory in vivo assays to try and obtain the same results/activity obtained by the ethnoveterinary practitioners. In a study done by Kambizi (2016), *Harpephyllum caffrum* and *Coddia rudis* were both separately tested for their antibacterial activity. The bark of *Harpephyllum caffrum* and the leaves of *Coddia rudis* were separately air dried at room temperature and water was used as a solvent. *Harpephyllum caffrum* extracts inhibited both Gram-negative and Gram-positive bacterial strains at an MIC ranging from 0.5 to 1 mg/ml while *Coddia rudis* was active at a rather high concentration of 5 mg/ml for all bacterial strains. Excellent MIC values were observed for crude

acetone extracts of the following plant species: *Maesa lanceolata* (0.02 mg/ml), *Bolusanthus speciosus, Hypericum roeperianum* and *Morus mesozygia* (0.04 mg/ml). These extracts were tested against *Bacillus anthracis* and showed promising antibacterial activity (Elisha et al. 2015). It was then suggested that *Maesa lanceolata* extracts could be used as a disinfectant and *Hypericum roeperianum* could also be used to protect animals against bacterial attack (Elisha et al. 2016).

A number of the plants documented in this study were also documented in the study of McGaw and Eloff (2008). Twenty-eight plants out of the total 83 (comprising 34%) documented in the past 10 years had already been recorded previously and in many cases this was for similar ailments. However, some of the plant species were found to be used for different ailments. According to Maphosa and Masika (2010) *Gunnera perpensa* is used by farmers of the Eastern Cape Province to treat intestinal parasites in goats while the same plant is used by both animals and woman for expulsion of afterbirth (Gerstner 1939). Luseba and Tshisikhawe (2013) recorded that the farmers of the Vhembe region in the Limpopo Province use *Ximenia americana* to treat wounds and calving difficulties while Van der Merwe et al. (2001) documented use of the same plant for intestinal parasites. Hutchings et al. (1996) also stated that *Ptaeroxylon obliquum* is used as an anthrax remedy and against ticks in cattle while Maphosa and Masika (2010) report that it is also used for intestinal parasites in goats.

10.5 Conclusion

Based on all the surveys mentioned, it can be concluded that the most frequently used plant part was the leaves and the common methods of preparation were decoctions and infusions. Decoctions were the most frequently used method as this involves boiling the plant material in water to extract water-soluble (polar) chemical compounds, and it could also detoxify poisonous plants depending on the type of toxins the plant contains (Maphosa and Masika 2010). Intestinal parasites were mentioned in most of the surveys, proving that they are a growing problem in most parts of the country. During the surveys, it was also found that some ethnic groups used a combination of two or more plant species during preparation to ensure that the treatment becomes effective, while other ethnic groups used single plant species (Luseba and Tshisikhawe 2013; Maphosa and Masika 2010; McGaw and Eloff 2008).

Relatively, few surveys specific to ethnoveterinary medicine were identified from 2008 to 2018 in South Africa. Out of these surveys, most were conducted in the Eastern Cape Province and a few in Venda, Limpopo. This shows that only two provinces out of a total of nine in South Africa have been investigated for ethnoveterinary practices over the past 10 years. Of all the identified plants, only few species were subsequently investigated for potential relevant biological activity. Hence, more research needs to be done on both ethnoveterinary field studies amongst different ethnic groups around South Africa, as well as pharmacological activity and toxicity investigations of ethnoveterinary remedies.

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