Original Research Article

ETHNOVETERINARY VALUES OF NIGERIAN MEDICINAL PLANTS

ABSTRACT

Background

Poor animal health is still a major problem limiting livestock productivity in sub-saharan Africa. Poverty and toxic effects of veterinary drugs have compelled poor resourced farmers to search for alternative medicine in Nigeria.

Methods

To determine whether traditional medicines were available to treat a number of animal diseases, literature review of the medicinal plants and traditional veterinary therapies in Nigeria was carried out leading to identification of more than 200 plants used in the treatment of animal diseases such as foot - and - mouth disease, mange, tuberculosis, pediculosis, streptothricosis, collibacilosis, Newcastle disease, helminthosis, cowdrosis, mange, malaria, amoebiasis etc.

Results

The responsible therapeutic phytochemicals are mainly alkaloids, tannins, saponins, glycosides, flavonoids phenols, minerals and vitamins.

Conclusions

The identification of these plants can complement or supplement the available modern veterinary drugs with a view to providing animal protein for 70% malnourished Nigerian populace. The identified plants may also be included in modern veterinary pharmacopoeia.

Keywords: Ethnomedicine, livestock diseases, malnutrition, Nigeria.

BACKGROUND

Since the domestication of animals some 10,000 years ago, stock raisers and handlers have naturally been concerned about livestock health [1]. Poor animal health is still a major problem limiting livestock productivity in sub-saharan Africa including Nigeria [2]. In 1992, Nigeria livestock population totaled 199.55 million with estimated cost of US $ 6,000 million [3]. Decline in funding

veterinary services and animal health and cost of veterinary services have pushed poor resourced farmers to search for alternative medicine [4]. Historically, both human and animal medicine has relied heavily on plant materials [5] and most cultures of the world have a wealth of knowledge of herbal medicine [4]. Trado-veterinary medical practices still play important roles in many areas of Nigeria [6]. Most major pharmaceutical companies started a century ago by selling plant extract [7] and approximately a quarter of all prescribed drugs currently sold in the western world still use active ingredients derived from plants [8]. Winrock International [9] indicated that over ₦54 billion is lost in animal productivity as a result of animal's diseases. Onyeyili et al. [10] reported an outbreak of accidental plant poisoning of sheep in an arid zone of Nigeria. In 2006, livestock industry in Nigeria experienced a serious setback caused by outbreak of avian influenza, which wiped out many birds from extreme far north passing through middle belt to southern part of the country. Up to 8 species of tick borne pathogens have been reported in dogs from Jos, Nigeria, with Babesia species being the most prevalent [11]. About 70% of 160 million Nigerian population is malnourished due to inadequate intake of animal protein because of poverty. Hence, literatures were searched to determine plants that are used to treat animal diseases in Nigeria with a view to boosting animal productivity.

MATERIALS AND METHODS

Past and recent text books, journals, proceedings, other periodicals and livestock farmers (Fulanis) were consulted for relevant information on plants that have been used to treat animal diseases in Nigeria. The plants and plant names (scientific, English, local), plant parts, therapeutic regimens, phytochemical principles and associated diseases were recorded. Plants used to treat poultry, large and small animal diseases were separated and grouped accordingly [12-123].

Some of the searched plants were given to animals either directly or ground into powder and added to animal feeds. Others were administered to animals as concoctions, infusions, or decoctions. However, some medicinal plants were given either in combination with sodium chloride or potash. In treatment of some diseases, two or more plants were combined or administered alone or together with sodium chloride as an adjuvant. In other diseases, oil was administered alone. Before use, plants that had toxic or antinutritional compounds, such as oxalates, tannins, saponins, phytates, alkaloids, nitrate/nitrite and others were subjected to soaking, boiling, toasting or fermentation to remove the toxic elements [18, 19].

3.0 RESULTS

A list of more than 200 plants with various medicinal values used in the treatment of animal diseases in Nigeria were evolved from various sources including literatures and personal contact. All the plants are obtainable in Nigeria with more diverse application to their medicinal uses amongst

Hausa and Fulani cattle rearers of Northern part of Nigeria. Knowledge of medicinal uses of the plants are also applied by some minority ethnic groups of the north which include Nupes, Gwaris, Tivs, Idomas etc. The north-western, south-eastern and south-southern ethnic groups which include Yorubas, Igbos and Efik/Ibibio respectively applied the knowledge of ethnoveterinary medicine in their animal husbandry.

From the over 200 medicinal plants identified and reported to have values in the treatment of large animal diseases, 125 were reported to have therapeutic property in the treatment of large animal diseases (table 1), while 68 had ethnomedicinal value in the treatment of poultry diseases (table 2) and 22 medicinal plants had been used in the treatment of small animals' diseases (table 3). However, the 125 plants reported for the treatment of large animal diseases have been tested using, camels, sheep, goats, horses, donkeys and cattle. About 30 out of 68 reported to have value in treatment of poultry diseases also were tested. But most of the plants reported to have value in the treatment of small animal diseases were tested using dogs, cats, rabbits, laboratory rodents such as mice and rats [13-82].

All the plants listed in this study and reported as having biological activity grow in mangrove swamps and rain forest in the south, bush region in the middle belt and thorny desert arid region in the far north. The plants are occasionally being used for the treatment of animal diseases in Nigeria as an alternative/complementary to orthodox medicine for better animal husbandry [13, 15].

DISSCUSION

The fact that over 200 medicinal plants are being used to treat animal diseases indicates that indigenous knowledge and practices would be useful in the promotion of animal health and production in Nigeria. Ethnoveterinary medical health care would be the only alternative to western veterinary therapy. These ethnoveterinary remedies which rely on local plant materials are practical, effective and cheap [21-25]. The observation that a preponderance of medicinal plants has value in treatment of animal diseases such as foot-and-mouth disease, rinderpest, kata, pediculosis, helminthosis, trypanosomosis, tuberculosis, Newcastle disease, fowl cholera, fowl typhoid etc. suggests a vast number of biologically active compounds in the plant kingdom that can be used in herbal veterinary medicine. Our findings are corroborated by the report of Aggarawal et al. [84] indicating that sick animals change their feed preferences to nibble at bitter herbs they would normally have rejected. For example, chimpanzee, chickens and sheep also behave in the same way. Lowland gorillas take 90% of their diet from the fruits of *Aframomum meleagueta*, a relative of the ginger, a potent antimicrobial which keeps shigellosis and similar infections at bay [85]. The plant also protects gorillas from fibrosing cardiomyopathy which has a devastating effect on captive animals. Some birds select nesting materials rich in antimicrobial agents which protect their young

from harmful bacteria. More so sick animals tend to forage plants rich in secondary metabolites such as tannins and alkaloids. Since these phytochemicals often have antiviral, antibacterial, antifungal and anthelmintic properties, a plausible case can be made for self-medication by animals in the wild [85]. Koala can live on the leaves and shoots of the *Eucalyptus*, a plant dangerous to most animals. Ancient Arabs fed their horses Alfa-alfa believing that it made the animals swift and strong. The controversial anti-cancer herb marketed by Henry Hoxsey was inspired by a cancer stricken horse who ate unusual herbs [94].

From the leaves, stems, roots, rhizomes, bulbs, fruits, oils and flowers of the plants listed in this report, herbal veterinary practitioners in Nigeria create and adopt many formulas for medicinal applications. The formulations are dictated by circumstances; the environment where the herd's man (in case of Fulanis) stays; the advice of his fortunetellers; the adversity of diseased condition and the Fulani's spiritual belief. The plant parts used and the availability and workability of the medicinal plants are also considered. A particular characteristic of plants is that the level and ratio of chemical constituents can vary within a species owing to differences in growth environment and heritable traits making the isolation and testing of active principles with probable medicinal values difficult [79]. Medicinal properties are dependent on secondary metabolites, such as glycosides, flvanonoids, alkaloids, and saponins [78, 79], which may be available in all plant parts, and concentration is associated with a particular plant part (89). Solvents used in extraction of the secondary metabolites could also affect the quality and quantity of the metabolites yielded [77].

Some plants such as *Vernonia amygdalina, Khaya senegalensis, Annona senegalensis, Anacardium occidentale, Mangifera indica, Abrus precatorius, Cassia occidentale*, etc have been demonstrated to be highly effective in the treatment of helminthosis in large animals. Also, *Paulina piñata, lagera pterodonta, Maytenus senegalensis, Carrisa edulis* were effective in the treatment of pasteurellosis. *Ocimum lamifolium, Hemizigia weiwitachi, Pericopsis laxiflora and Adenocarpus mannii* show therapeutic activity in the treatment of cowdriosis. *Acacia nilotica, Gardenia erubescens, Vigna unguiculata* and *Tapinathus glabiferus* were reported to be effective in foot-and-mouth disease in large animals (Table 1). Furthermore, *Cannabis indica, Datura metel, Solanum incanum and Solanum nodiflorum* were said to be effective in the treatment of Newcastle disease (table 2). But *Elaeis guinensis, Citrus aurantium, Khaya ivorensis, Annona squamosa,* and *Tephrosia vogellii* were demonstrated to have high effect in the therapy of psoroptic mange in small and large animals (table 1 and 3). Although *Azadirachta indica, Abrus precatorius, Nauclea latifolia* were demonstrated to have very high effect in the treatment of rodent malaria caused by *plasmodium berghei* in mice, many of the reported plants were demonstrated or claimed to have been used for the treatment of several other diseases. The plants are *Annona senegalensis* used in the treatment of pediculosis, helminthosis and pasteurellosis. *Solanum nodiflorum* was claimed to have activity in the

treatment of helminthosis, Newcastle disease, coccidiosis, fowl typhoid, and fowl cholera (Tables 1 and 2). *Khaya senegalensis* has been reported to be effective in the treatment of coccidiosis, amoebiasis, helminthosis and Newcastle disease (Table 2). *Abrus precatorius* was demonstrated to have efficacy in the treatment of rodent malaria both in terms of clearing parasite and improving haematological parameters of the infected mice (Table 3). *Azadirachta indica* has potent antifungal activity against *Aspergilus fumigatus*, *Candida albicans, Cryptococcus neorforman* [124] and inhibited hatching of egg and larval development of *Haemonchus contortus* [125] *A. indica* also showed relative antimicrobial activity against *Staphylococcus auveus, Escherichia coli, Enterococcus faccalis and Pseudomonas aeruginosa [126]. Terminalia avicenoides* contain triterpenes such as arjunolic acid, α-amyrin and 2,3,23-trihydroxylolean-12-ene [127] which exhibit larvicidal activity [128]. Plants listed in this report should not be abused but rather be used only for the listed medicinal purposes. Many species of *Crotalaria* are used in medicinal preparations and medicinal practice. *Crotalaria* poisoning occurred in livestock [58]. It cantains pyrrolizidine alkaloids which are toxic to mammals [70]. Lack of controlled experiments on the reported plants means toxic levels have not been defined and the plant constituents may affect more than one body system. Use of more than the therapeutic values may lead to overdoses with serious consequences [13]. For example, catechins from *Acacia nilotica* causes oesophogeal cancer. *Khaya senegalensis* contains limonoid which is a limonene-like component of volatile oil. It is toxic to insect [92]. *Azadirachta indica* contains azidirachtin which has insecticidal activity [93]. *Vitex doniana* contains aryl glycoside which is involved in induction of xenobiotic metabolizing enzyme, cell cycle regulation (a poptosis and proliferation), liver and immune system development and vascular remodeling [93, 94]. *Vitex doniana* is used for the treatment of worm infestation in animals. *Momordica balsamina* contains albumin, globulin, glutelin, amino acids and momordicine. But albumin and globulin form binding sites for acidic (e.g. penicillins, cephalosporins) and basic (e.g. prazosine, quindine), drugs respectively [96]. Amino butyric acid is an inhibitory neurotransmitter [93]. Alliin and allicin from *Allium sativum* are antidiabetic [93]. Sulphur boost the immune status of animals. The antibacterial activity of *Cannabis sativus* may be attributable to cannabidiol, cannabigerol and tetrahydroxycannabinol that causes euphoria. Cannabidiol can block anxiety produced by tetrahydroxycannabinol [93]. Cannabis indica is used to treat infectious diseases in animals. *Mangifera indica* contains quercetin which is anti-hypertensive [98] but poses risk of stomach, intestine and urinary bladder cancer [91]. Cedar oil produced by *Cedrus deodara* causes inflammation of alimentary tract and kidney [99]. *Cannarrium schweinfurthi* contains amyrin, phellandrine and limonene that have activity agains insects. Toxalbumin produced by *Cassia occidentalis* causes toxicity in twin-lambs [100].

The plants reported in this study may not be an exhaustive list of medicinal species nor application. Medicinal plants are continually being discovered, and the changes in the traditional therapeutics can be continually expected, hence no compilation in this area of ethnoveterinary

medicine is ever final. But the production and supply of these plants is a major factor in the systemic and regular use of the listed herbal preparations. Identifying the natural environment in which the plants appear should support the cultivation of the plants [84].

Although, the practice of veterinary medicine in Nigeria is faced with a number of set backs which include; cost of veterinary drugs; inadequate number of practicing vets (i.e. 1 vet: 37,500 animals); quackery; lack of awareness about the importance of veterinary medicine; inadequate implementation of legislature concerning veterinary practice; merging of veterinary and agro-services under one ministry; inadequate budgetary allocation to agricultural sector; lack of motivation from the side of government to individuals to set up veterinary pharmaceutical companies; and unnecessary interference with services of veterinarians by medical doctors e.g. the outbreak of avian influenza in Nigeria in 2006 was a typical situation that brought an argument of who was to handle the situation; is it a medical doctor or a veterinarian. The sporadic and endemic outbreak of Ebola virus infection in some West African countries including Nigeria in 2014 is another typical. In the present outbreak of the disease, veterinarians have not been called to play their role for control of the disease. Although bitter kola and sodium chloride have been allged to cure the disease, no scientific study has proven that. Therefore, the incorporation and integration of the useful knowledge about the plants into primary healthcare system of veterinary practice in Nigeria should be considered an issue of prime importance. Use of the plants would undoubtedly minimize the cost of treatment and limit side or toxic effects of orthodox veterinary drugs that are currently being used. By so doing animal productivity will increase, which invariably will lead to increased availability of animal protein that may serve 70% malnourished Nigerian populace, that are languishing in abject poverty. In addition, pharmaceutical industries in Nigeria should be encouraged to investigate the plants purported to have therapeutic value in animal diseases. As scientific studies and clinical trials on toxicity and standard doses of these plant materials could eventually result in their inclusion in the modern veterinary pharmacopoeia. The fact that some of the reported plants are being used to treat animal diseases in Nigeria, Uganda, Democratic Republic of Congo, Sri-Lanka, Nepal, South Africa and Saudi Arabia [110-119] may connote the origin of ethnoveterinary medicine in Africa and Asia. More so, the two continents could be sources for raw materials for synthesis of veterinary drugs. At the present time of economic meltdown, there is need for African Union (AU) to start investigating the plants in the region for their medicinal values in animal diseases. Similar work was done by various African countries in the field of human medicine [110]. After having established the plants, efforts should be made by the Governments of African Union to establish a regional pharmaceutical industry with intent to harnessing resources that will be used for manufacturing veterinary drugs in the region. By so doing, that will complement or supplement the available animal drugs and invariably bringing down the cost of veterinary drugs in Nigeria so as to boost livestock productivity in the poor region.

Also, animal productivity can serve as source of revenue generation for countries under African Union. Such countries include Nigeria, Niger, Mali, Libya etc.

CONCLUSION

The presence of preponderance of medicinal plants that can be used in the treatment of animal diseases in Nigeria may suggest that Nigerian plants can serve as resource for veterinary drugs that can be used to treat a myriad of animal diseases.

DECLARATIONS

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Not applicable

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572 Table 1: Tropical plants that are used to treat large animal diseases in Nigeria

S/No.	Scientific, generic, species and English name(s)	Vernacular names	Part(s) used	Therapeutic regimens(s)	Phytochemical principles	Animal disease(s)
1.	Mimosasae *Acacia nilotica* (locust bean)	Bagaruwa (H) Gabaruwa (N)	Dried bark, fruits, and seeds	Infusion of pounded plant parts used to wash affected parts	Gallotannins, catechins	Foot and mouth disease
2.	Rubiaceae *Gardenia erubescens* Syn: *Gardenia aquella* (Gardenia)	Gaude (H) Dingali (F)	Seeds, root	Seed powder with egret and chicken faeces	Crocin, tannin	Foot-and-mouth disease
3.	Papilionaceae *Vigna unguiculata* (common bean)	Wanke (H) Agwa (I) Ezo (N) Ewa (Y)	Seeds, flower	The powder with egret and chicken faeces	Proteins	Foot-and-mouth disease, oedema, inflammation
4.	Compositae/Asteraceae *Vernonia amygdalmia* (Bitter leaf)	Shiwaka (H) Ewuro (Y) Tsula (N) Olubo (I)	Leaves	The powder mix with salt and infusion is given oftenly	Vernodalin, vernolepin, vernomygdin, tannins, saponin, vitamin C, Root is toxic	Helminthosis, bacteria infection
5.	Melastomataceae *Khaya senegalensis* (Mahogany tree)	Madaci (H), Ono (I) Dalchi (F) Wuchi (N) Oganwo (Y)	Barks, seed oil	The powder with potash or bran give: root powder is applied topically	Limonoid, sapoletin, tannins, saponins, sterol, manganese	Helminthosis, bacterial infection, ectoparasites infestation, trypanosomosis, dysentery
6.	Meliaceae *Azadirachta indica* (Neem tree)	Nimu (N) Dogonyaro (I) Dogonyaro (H)	Barks, oil	Infusion of the powder with potash or salt given; oil is rubbed	Nimbin, azadiractin, salanin,, meliacin, limbolide	Helminthosis, sarpcoroptic, psoroptic mange, inflammation
7.	Sapotaceae *Vitallaria paradoxa, Butyrospermum parkii; Batyrospermum paradoxum* (Shea butter tree)	Kadanya (H) Karereyi (F) Ori (Y), Kochi (N)	Barks	Bark infusion or decoction is given	Fixed oils, alkaloids	Helminthosis, dermatomycosis, poisoning, dysentery, diarrhoea
8.	Verbenaceae *Vitex cienkowskii*, Syn; *vitex doniana* (Black plum)	Dinya (H) Dinchi (N) Oriri (Y)	Barks, leaves, fruits	Decoction is given to calves.	Arylglycoside	Helminthosis, skin infection, colic, dysentery, diarrhea
9.	Cucurbitaceae *Momordica balsamina* (Balsam pear)	Garahuni (H) Ejinrin (Y) Ibuzo akban ndene (I) Garafini (N)	Leaves	Powder mix with cattle urine or the infusion is given to calves.	Momordicine glutelin, albumin, globunin, aminobutyric acid	Helminthosis

10.	Liliaceae/Aliaceae *Alium sativum* (Garlic)	Tafarnuwa (H) Taparnuwa (F) Tafarnuwa (N), Aayu (Y)	Leaves	Decoction is given to animals	Allicin, alliin, sulphur, oil, flavonoid, saponin, Vitamins A,B,C	Pasteurellosis
11.	Caelsapiniaceae *Tamarindus indica*, (Tamarind tree, Indian tamarind)	Tsamiya (H) Darachi (N) Ajagbon (Y), Icheku Oyibo (I)	Roots	Decoction is prepared from A. senegalensis and T. indica, given.	Tannins, tartaric, malic and citric acids	Helminthosis, trypanosomosis
12.	Annonaceae *Annona senegalensis* (Sour sop)	Gwandar juji (H), Dukuje (F) Dukuhi (F), Labo (Y) Numgberechi (N), Uburuocha (I)	Roots	Decoction is prepared with root of T. indica and A.senegalensis and give to animals	Tannins, annonaine, mucilage	Pediculosis, helminthosis, pasteurethosis, lousness, cough, Trypanosomosis, diarrhea, dysentery
13.	Burseraceae *Boswelia dalziellii* (Frankinsecence tree)	Ararabi (H) Gogagi (N)	Stem bark	The powder mixed with feed and given to animals	Bassorin, resin, boswellinic acid, essential oil, gum	Pediculosis, Trypanosomosis, lousness
14.	Moreaceae *Ficus platyphylla* (Gutta percha tree)	Gamiji (H) Dundehi (F) Gbagun, Gbanchi dzurugi (N) Afomo (Y)	Barks, leaves	The powder with salt or potash is given to animal for licking	Saponins, flavonoids, tannins	Contagious pluropneumonia (CBPP), prophylaxis threatening abortion
15.	Cannabaceae *Cannabis indica* (Indican shot)	Bakalele, Bakare kare (H)	Leaves	Infusion is given to animals	Tetrahydrocannabinol, cannabidiolic acid, canabigerol	Antibiotic
16.	*Afzelia africana* (African Afzelia, counter wood tree)	Kawo (H) Akpalata (I) Bachi (N) Apa (Y)	Leaves, stembark	Decoction or infusion given to animals	Alkaloids. Tannins	Helminthosis, Trypanosomosis
17.	Anacardiaceae *Mangifera indica* (Mango)	Mungoro (N) Mangolo (I) Mangoro (Y) Mangwaro (H)	Roots	Roots infusion with salt is given to animals	Tannins, resins, quercetin, glycoside, flavonoids, Vitamins A,B & C, saponin	Helminthosis, rinderpest, ringworm, scabies, hepatic diseases
18.	Rutaceae *Citrus aurantium*, Syn: *Citrus sinensis* (Lemon tree)	Lemu maizaki (H) Lemu nasara (N)	Root bark	Mix the powder with butter and apply through the anus	Citric acid, volatile oil	Trypanosomosis
19.	Myrsinaceae *Embelia ribes* Syn: *Embelia glandulifera* (False pepper)	Baran kabit (A)	Berries, leaves, oil	Powdered beries mixed with food; leaves extract rubbed	Embelin, villangine, rapanone	Psoroptic mange, Tape worm infestation, ring worm

20.	Pinaceae *Pinus deodara* Syn: *Cedrus lubant*, *Cedrus deodara* (Deodar cedar)	Shaj-ul-jim (A)	Bark	Decoction is made and given powder is mixed with feed.	A and B himachalene, atlantone, himachalol, cedar wood oil	Antidote to snake bite, dysentery, skin diseases, ulcer
21.	Burseraceae *Canarium Schweinfurthii* (False walnut)	Atile (H) Mbiji (I) Esha (N) Origbo (Y)	Bark	Decoctions made and given to animals; the smoke repel or kill insects	Amyrin, limonene, phellandrine, resin, tannin, saponin	Helminthosis, insecticide
22.	Anacardiaceae *Anacarduim occidentale* (Cashew)	Kashew (H) Kausu (I) Kashiwu (N) Kaju (Y), Shase (T)	Stem bark	The powder is mixed with animal feed; Smoke repel or kill insects	Cardol, sitosterin, gallic acid, anacardic acid, phenol, resorcinol, tannin	Diarrhea, antifungal, antibiotic, infertility, arthritis, hepatitis
23.	Caelsapiniaceae *Senna occidentalis*, *Cassia occidentalis* (Negro coffee)	Tapassa (F) Kwarkwati (H) Okama (I) Rere (Y), Gaya (N)	Leaves, seeds	Infusion or decoction is given to animals; Smoke repel insects	Tannins, resins, sennoides A,B & C, toxalbumin, fixed oil, flavonoid	Bacterial infections, black quarter, foot-and-mouth disease, Helminthosis, debility, constipation, tuberculosis, anaemia, oedema, antiviral, antifungal
24.	Convolvulaceae *Ipomea sarifolia* (Child cigaret)	Sigar yara (H) Lakanko (N) Odoko (Y)	Leaves	The powder is mixed with feed: concoction can also be given	Alkaloid, tannin, saponin, flavonoid	Collibacillosis, pasteurellosis, dystocia, helminthosis cough
25.	Amaranthaceae *Amaranthus pinosus* (Spiny amaranth)	Namijin gasaya (H) Tete degum (Y) Kunguraku(I) Inine ogwu (I) Ekan shanshangi (N)	Leaves	The powder is mixed with feed; concoction is given to animals	Alkaloids, tannin, saponin, flavonoid, hydrocyanic acid	Colibacillosis, pasteurellosis
26.	Anacardiaceae *Lamnea barteri* Syn: *Lamnea Kerstingii* (Monkey akee)	Faru (H) Yinchi (N) Ekika (Y) Sonyi (F)	Root bark, stem bark	The powder is mixed with cow fat and give orally	Tannins	Trypanosomosis, tuberculosis, babesiosis, haematuria
27.	Myrtaceae *Psidum guajava* (Guava)	Gwaba (H) Ngoyaabehi (F) Ugwoba (I) Goyiba (N), Guafa (Y)	Roots, Leaves	Decoction with salt is given to animals: leaf infusion is given	Saponin, sapogenin, eugenol, quarcetin, vitamins A& B group	Trypanosomosis, Helminthosis, scours, diarrhea, antimicrobial, cough, dysentery
28.	Mimosasae	Dorowa (H)	Roots,	Infusion is	Tannins,	Trypanosomosis

	Parkia biglobosa Syn: *Parkia clappertoniana* (Niffa)	Ogirili (I) Lonchi (W) Iru, Igba (Y)	Leaves	given to animals: powder is also mixed with feed	saponins, alkaloids	
29.	Bombacaceae *Adansonia digitata* (Baobab tree, Monkey bread tree)	Kuka (H) Akpo (I) Muchi (N) Oshe (Y)	Leaves	The powdered leaf is mixed with cold water and salt and give to animals	Adansomine, flavonoside, oxalates, uronic acid, catechins	Trypanosomosis
30.	Vitaceae *Cissus populnea* (Kangaroo vine)	Dafara (H) Labata (H) Korolambawo (N) Ajawa (Y)	Leaves	The decoction is given to animals to drink	Physcion, chrysophanol	Trypanosomosis
31.	Combretaceae *Terminalia avicenoides* ( )	Baushe (H) wahe (F)	Stem bark	The decoction with palm oil and cheese is given to animals	Castalagin, flavogallonic acid, dilactone argunolic acid, α-amyrin, 2,3,23-trihdroxylolean c-12-ene	Trypanosomosis
32.	Solanaceae *Capsicum frutescens* (Pepper)	Barkono (H) Yakayiringi (N) Ataibile (Y)	Fruits	Pound with groundnut and give the animals to eat	Capsaicin, oil, ascorbic acid	Trypanosomosis
33.	Papilionaceae *Lonchocarpus Laxiflorus* (Senegal lilac)	Shuni (H)	Stem barks	The powder mixed with guinea corn powder and potash and give to animals	Indicant	Trypanosomosis
34.	Fabaceae *Parkinsonia aculeate* (Jemsalen thorn)	Sasabani (H)	Stem bark	The powder of stem bark of 1. Aculeata and E. senegalensis and leaf powder of Striga spp given	Glycerol, sitosterol, glycerides	Trypanosomosis
35.	Mimosasae *Prosopis africana* (Iron wood)	Kiriya (H) kohi (F0 Ubwa (I) sanchi (N), Ayah (Y)	Stem bark	The decoction of stem bark of A. Africana and P. Africana with potash	14α-demethylase anthraquinones, xanthones, berberine, chromenes	Trypanosomosis
36.	Combretaceae *Gueira senegalensis* (Moshi medicine)	Sabara (W)	Leaves	The decoction is given to animals	Tannins, alkaloids, catechins	Trypanosomosis
37.	Caelsalpiniaceae *Piliostigma reticulatum* Syn: *Piliostigma thoningii* (Camel's foot)	Kalgo (H) Barkehi (F)	Seeds	The powdered seed is given to animals	Alkaloids, tannins	Trypanosomosis

38.	Solanaceae *Solanum spp* (Garden egg)	Yalo (H) Ahera (I) Yengiy (N) Igba (Y)	Leaves	The powdered is mixed with drinking water and given to animals	Amino-4-ethyl glyoxaline, solanine, trigonelline, choline	Trypanosomosis
39.	Asparagaceae *Albuca bracteata* (Wild onion)	Gadali (H)	Leaves	The powder is put in drinking water	-	Trypanosomosis
40.	Solanaceae *Nicotiana tobaccum* (Tobacco plant)	Taba (H) Taaba (F) Taba (N)	Leaves	The powder of N. tobaccum, stem bark of D. dalzieli and A. obesum is given to animals	Nicotine: CNS stimulant and carcinogenic	Trypanosomosis, pasteurellosis, ectoparasistes infestation
41.	Apocynaceae *Saba florida* (Rubber wine)	-	Stem bark	The decoction with salt is given to animals	Vitamins A & E, lipids	Trypanosomosis
42.	Lauraceae *Cassytha filiformis* (Green duder, Seashore duder)	Runfa gada (H) Aca-agadi (Y) Solo chenche (N) Ominiginiginil (Y)	Seeds	The powdered decoction is given to animals	Laurotetanine, mucilage, tannins	Trypanosomosis, fertility
43.	Lythraceae *Lawsonia inermis* (Henna plant)	Lalle (H) Lali (N) Lali (Y)	Leaves	The powder with ground nut is given	Lawsone, lawsonide, tannins resin	Trypanosomosis
44.	Fabaceae *Crotalaria retusa* (Rattle Box; Devil bean)	Gyadar yara (H) Korupo (Y) Birji-bei (F)	Whole plant	The decoction is bathed	Monocrotaline	Oestrus, scabies, colic, drive away snake
45.	Fabaceae *Crotalaria lachnosema* (Gamba-pea)	Farar birana (H) korupo (Y) Birji-beri (F)	Whole plant	The decoction is bathed	Crotaline	Oestrus, scabies, colic,liver disease flatulence
46.	Fabaceae *Crotalaria microcarpa* (Yew)	Biranar zomo (H)	Whole plant	The powder is put in water and given to animals	Pyrrolizidine N-oxide	Liver diseases
47.	Fabaceae *Crotalaria juncea* (Bengal hemp)	Hudar awaki (H)	Whole plant	Decoction is made and given to animals	Trichodesmine, senecionmine	Haemoptysis in horses
48.	Fabaceae *Crotalaria fulva* (Twany crotalaria)	Bi rana (H)	Whole plant	Decoction is made and given to animals	Fulvine, monocrotaline	Medicine: not specified
49.	Fabaceae *Crotalaria incana* (Fuzzy rattlebox)	Jar bi rana (H)	Whole plant	Decoctionor infusion is given to animals	Integerrimine	Medicine: not specified
50.	Fabaceae *Crotalaria laburnifolia* (Muna)	Bi rana (H)	Whole plant	Decoction or infusion is given to	Anacrotine, crotafoline, hydroxy-	Medicine: not specified

				animals	senkirikine	
51.	Fabaceae *Crotalaria mucronata* (Smoth rattlepod)	Farar bi rana (H)	Whole plant	Decoction or infusion is given to animals	Intergerrininie	Medicine: not specified
52.	Fabaceae *Crotalaria recta*	Gujiyar awaki (H) Gyadar awaki (H)	Whole plant	Decoction or infusion is administered to animals	Monocrotaline	Medicine: not specified
53.	Fabaceae *Crotalaria verrucosa* (Bird flower)	Bi rana (H)	Whole plant	Decoction or infusion is administered to animals	Pyrrolizidine alkaloid	Medicine: not specified
54.	Fabaceae *Crotalaria gorensis* (Morula; Cat thorn)	Bi rana (H)	Whole plant	Decoction or infusion is given to animals	Pyrrolizidine alkaloid	Sores: not specified
55.	Sterculiaceae *Sterculia setigera* (Karay gum tree)	Kukkuki (H) Boboli (F) Kokongiga (N) Eso funfun (Y)	Stem bark	Dried stem bark is mixed with feed and administered to animals	Tannins, rhamnose, galacturonic acid	Wound, ulcer, astringent
56.	Anacardiaceae *Sclerocarya birrea* (Marula)	Danya (H) Edi (F) Jinjere goyi (N)	Dried stem bark	Decoction is given to animals	Tannins	Dystentery, diarrhea, astringent
57.	Caesalpiniaceae *Cassia alata* Syn: *Senna alata* (Craw plant)	Okpo (I) Gungoraoko (N) Asunwon (Y)	Flower, leaves	Powdered plant mixed with feed; Decoction is given orally	Glycoside, saponin, Azulene, tannin, guanine, resins, flavonoid, chrysoparic acid	Mycoses, bacterial infections
58.	Verbenacea *Lippia adoensis* (Tea bush)	Aalali (F)	Flowers; cause photo dermatosis in cattle.	The powder is mixed with feed.	Linalool	Black quarter, pasteurellosis
59.	Rosaceae *Rubus fellatae* (Guinea Fula-pulaar)	Nymyarnge (F)	Leaf	The powder is applied to wound topically		Black leg
60.	Rosaceae *Solanum aculaestrum* (Poison apple)	Gitae naii (F)	Leaf	The powder is applied topically	Solasodine	Dermatophylosis
61.	Meliaceae *Khaya anthotheca* (White mahogany)	Kahi (F)	Stem bark	The powder is mixed with feed	Triterpenoids	Heamaturia, dermatophilosis, babesisosis, fascioliasis, scours
62.	Hypericaceae *Psorospermum guinensis*	Sowoiki (F)	Stem bark	The moist powder is topically	Tannins, xanthones, anthraquinones	Dermatophilosis
63.	Sapindaceae	Shedewoi (F)	Leaves juice	Juice or	Alkaloids,	Pasteurellosis

	Opaulinia pinata (Timbo)	Yatsubiyar (H) Kakanchela (N) Kakasela (Y)		decoction is administered orally	saponins, tannins, inulin	
64.	Asteraceae *Laggera pterodonta*	Bowogolhi (F)	Roots	Infusion is given to animals	Eudesmane, peterodontoside A & B	Pasteurellosis
65.	Celastraceae *Maytenus senegallensis* (Confetti tree; Red spike thorn)	Tultulki (F) Namijin tsada (H) Shepolohun (Y) Kukukamman (N)	Roots	Grind into powder and mix with feed	Maystansine, flavonol, wax	Pasteurellosis
66.	Apocynaceae *Carissa edulis* (Natal plum)	Beiboni (F)	Roots	Ground into powder and mix with feed	Alkaloids, sterols, resin	Pasteurellosis
67.	Liliaceae/Aliaceae *Allium cepa* (Onion)	Albasa (H) Alubosa (I) Luba (N) Alubosa (Y)	Bulbs	Decoction is administered to affectered animals	Sulphur, riboflavin, allicin, alliin, alliinase,	Pasturellosis, cowdriosis
68.	Loranthaceae *Englerina gabonensis* sub *sp. gabonensis*	Store socooiki (F)	Leaves	Decoction is used to wash the lesions		Foot-and-mouth disease
69.	Loranthaceae *Globimatula globiferus* var. letuzeyi (Mistletoe)	Store peluwahi (F)	Leaves, roots	Decoction is given orally and applied topically		Foot-and-mouth disease
70.	Loranthaceae *Tapinathus globiferus* sub *sp. Letuzehi*	Store bawshihi (F)	Root	Powder applied to lesions	Hydrogen cyanide oxalate, tannin, calcium, phosphorus	Foot-and-mouth disease
71.	Loranthaceae *Tapinathus globiferus* sub *sp. Apodanthus* (Sprague)	Store karchi (F)	Root	Decoction is given to animals	Hydrogen cyanide, oxalate, tannin, potassium, magnesium, calcium, phosphorus	Foot-and-mouth disease
72.	Lamiaceae *Ocimum lamifolium*	Liollebei ladde (F)	Leaves	Decoction is given to animals	Oil, eugenol	Cowdriosis
73.	Labiatae *Hemizigia welwitachi*	Dutalhi(F)				Cowdriosis
74.	Fabaceae *Pericopsis laxiflora* Syn: *Afromasia Laxiflora* (Mosquito bush)	Makarto (H) Shedu (Y) Abuaocha (I) Konkotirochi (F) Kpakangichi	Roots, barks	Decoction is administered orally to affected animals	Angolensin, 2-0-methylangolensin, tannin	Cowdriosis

		(N)				
75.	Leguminosae *Adenocarpus mannii*	Nannani (F)	Root	Decoction is given to animals	Flavone-C, flavonones, isoflavone	Cowdriosis
76.	Anacardiaceae *Pseudospondias microcarpa* (African grape)	Lillahi (F) Jillahi (F)	Root	Infusion or decoction is administered	Alkaloid, tannins, terpenoids, hethrosides	Brucellosis, babesiosia, haematoria
77.	Arahiaceae *Sheflera abyssinica* (Ethiopian plant)	Ifoyaahi (F)				Brucellosis,
78.	Rutaceae *Citrus limon* (Lemon)	Lemuhi (F)	Fruits, leaves	Decoction is administered to affected animals	Volatile oil	Brucellosis,
79.	Rubiaceae *Crossopteryx febrifuge* (Coffee senna)	Rimajogoohi (F)kasfiya (H) Nambisunsun (N) Syeye (Y)	Twigs, leaves	Decoction administered orally; bath the affected of scabies	Crossoptine, pholobaphene, phytosterol, glycoside; B-quinovine	Scabies, Brucellosis, babesiosis, haematuria
80.	Mimosasae *Dichrostachys glomerata; Dicostachys unerea* (Cow thorn)	Barli (F) Dundu (H) Amiogwu (I) Ekannanko (N) Kara (Y)	Root	Decoction is given to affected animals	Tannins, alkaloids	Ringworm, kata, fascioliasis, rinderpest,
81.	Caesalpiniaceae *Piliostigma thonningii* (Thonning's piliostigma)	Kalgo (H) Okpoatu (I) Bafin (N) Abafe (Y) Barkehi (F)	Root	Decoction is administered to animals	Alkaloids, tannins	Ringworm, scours, fascioliasis
82.	Euphorbiaceae *Bridelia ferruginea*	Budduudi (F)	Root	Decoction applied topically powder mixed with feed	Alkaloids, anthraquinone, flavonoids, tannins, cardiac glycoside saponins	Ringworm, scours
83.	Combretaceae *Terminalia glauscens* Syn: *T. schimperina* (Violet tree; Rhodes tree)	Bawshishi (F) Baushe (H) Edo (I) Kpace, (N) Igiodan (Y)	Stem bark, root bark	Decoction given to animals.	Tannins alkaloids	Ringworm, fascoliasis
84.	Fabaceae *Desmodium velutinum* (Velvet-leaf; Desmodium)	Takkamani (F) Dankadafi (H) Labalabangi (N) Emo, eeno (Y)	Whole of the shoot	Decoction with potash given to animals	Resins, tannins, flavonoids, saponins, glycosides	Abortion
85.	Asteraceae *Bidens pilosa* (Beggar tick)	Bitachi (F)	Roots, leaves	Decoction is given during labour	Okanin aesculatin, amyrin, cardinal aurone,	Abortion infertility

					amyrin	
86.	*Englerina onchroleuca* (Crooked false medlar)	Store bumenahi (F)	Leaves	Decoction or infusion is given	-	Abortion infertility
87.	Rubiaceae *Oldelandia herbaceae* (Slender oldelandia)	Saarmalci (F)	Leaves	Infusion is given during abortion	Ursolic acid, kaempferols hexacosanes	Abortion infertility
88.	Papilionaceae *Pterocarpus erinaceus* (African teak)	Bannuli (F) Madobiya (H) Ageega (I) Zanchi (N), apepe (Y)	Stem bark, leaves	Powder is mixed with feed and given to animals	Alkaloids, tannins resins	Babesiosis, haematuria
89.	Combretaceae *Anogeissus leocarpus* (Axle wood tree)	Kojoli (F) Marike (H) Atara (I) Kukundu (N) Ayin (Y)	Roots, stem bark	Decoction is given to affected animals	Flavonoids, gallic and ellagic acids, tannins	Scours, helminthosis tuberculosis
90.	Fabaceae *Indigofera suffrusticosa* (West Indian indigo)	Poldi (F)	Roots, stem bark	Decoction is given to affected animals	Flavonoids, gallic and ellagic acids, tannins	Scours, helminthosis tuberculosis
91.	Graminae/Poaceae *Echinochloa pyramidallis* (Antelope grass)	Bililliyawoi (F) Sabe (H) Kabadoko (N)	Whole plant	Decoction is used to wash the affected udder	Flavonoids, tannins, sterols & resins	Mastitis
92.	*Lagerra pteridonta*	Bowoglhi (F)	Leaves	Decoction is given	-	Mastitis
93.	*Guinea altissima*	Gadaal doroji	Roots	Udder is washed with decoction	-	Mastitis
94.	Fabaceae *Dalbaergia lacteal*	Balechi (F)	Leaves	Decoction is given		Mastitis
95.	*Urelytrum digitata*	Nikiti (F)	Leaves	Decoction is administered orally	-	Fascioliasis
96.	Combretaceae *Terminalia mollis*	Bawshishi (F)	Leaves	Decoction is given	Pumcalgin freedelin, catechin, epicatechin, gallocatechin, epigallocatechin	Fascioliasis
97.	Asteraceae *Erigeron floribundus*	Katcatnegelhi (F)	Roots	Infusion is given orally	Flavonoids, saponins, tannins	Fascioliasis
98.	Compositae/Asteracceae *Vernonia guinensis*	Ibbilis	Leaves	Decoctionis given orally	Matairesinol, dibenzylbutyrolactol, deodarin, deodardion, cedeodarin	Fascioliasis
99.	Pinaceae	-	Oil	Oil is rubbed	-	Psorptic, mange

	Cedrus deodara (Deodar)			the affected part		
100.	annonaceae *Annona squamosa* (Suger apple)	-	Seeds	The powder is mixed with water and applied topically	Anonaine, roemerine, noreoridine, corydine, norisocorydine, isocorydine, glauline	Pediculosis
101.	Legumnosae *Tephrosia vogellii* (Fish bean)	Jimfaa (H)	Seeds	The powder with water applied topically	Tephrosin, isotephrosine degueline, rotenone	Pediculosis
102.	Anacardiaceae *Anacardium occidentale* (Cashew)	Kashew (H) Kausu (I) Kashiwu (N) Kaju (Y)	Gum, shell, nut oil	Oil and powder red shell applied topically	Tannins, cardol, sitosterin, phenols, galic acid	Pediculosis, lousiness
103.	Balanitaceae *Balanites aegyptiaca* (Soap berry tree)	Aduwaa (H) Aduwa (N)	Kernel oil	Rubbed the affected part	Disogenin, yamogenin zachum oil	Pediculosis, lousiness
104.	Malvaceae *Sida carpinifolia* (Common wire weed)	-	Leaves	Applied decoction topically	Flavonoids	Skin parasites infections.
105.	*Euphorbiaceae* Euphorbia deightonic	Tinya (H)	Leaves roots	Applied the infusion anddecoction topically	-	Pediculosis, tick infestation, mange
106.	Anacardiaceae *Spondias mombin* (Hog plum)	Tsadar masar (H) Jinkara (I) Jinjirechi (N) Akika (Y)	Leaves, seeds, stem bark	Decoction is given to the affected animals	Geraniin, gerannin galloygeranin tannins	Coxsakie B_2 and Herpes simplex type 1 viruses
107.	Asclepiaceae *Calotropis procera* (Sodom apple)	Tunfafiya (H) Epuko (N) Bomubomu (Y)	Root bark	Decoction is given to affected animals	Calotropin, calotoxin uscharin usharidin, Mudarin	Colibacillosis, shigellosis, gonorrhea, salmonellosis
108.	Boraginaceae *Heliotropium indicum* (Wild clary)	Kalkashin kirama (H) Etigulu (N) Ogbe-akuko (Y)	Wilde plant	Infusion or decoction administered to animals	Indicine –N-oxide, saponin, tannin, alkaloids	Helminthosis
109.	Caesalpiniaceae *Berlinia bracteolosa*	Apado (Y) Banborochi (N) Dokarrafi (H) Ububa (I)	Stem bark	Infusion is given to pregnant animals at term	Inulin, tannin, saponin	Dystocia
110.	Caesalpiniaceae *Daniellia oliveri* (Ilorin balsam)	Maje (H) Ozabwa (I) Danchi (N) Iya (Y)	Stem bark	Decoction is administered orally to affected animal	Alkaloids, tannins, gum, essential oil	Snake bite

111.	Melastomataceae *Heterotis rotundifolia* (Svenska)	Edingibata (N) Dogunrasin (Y)	Whole plant, root	Decoction is given to affected animals	Inulin, saponnin, tannins, manganese	Peste-despetit, trypanosomosis, runderpest
112.	Mimosasae *Entada africana* (Viffa)	Tawatsa (H) Ogurube (Y) Kawonuwanch i (N)	Roots	Infusion or decoction is administered orally: Powdered is mixed with water and placed on wound	Paucine, tannins, retenone saponins	Dystocia wound
113.	Polygalaceae *Securida longepedunculata* (Violet tree)	Jechi (N) Ofoo (Y) Sanya (H)	Roots, stem bark	Decoction is given to affected animals	Saponins, oleanoic acid, valerianate methy salicylate	Tuberculosis, dystocia
114.	Pedaliaceae *Sesamum indicum* (Sesame)	Ridi (H) Beni (I) Nimbolo (N) Ekuku-gogoro (Y)	Whole plant	Juice of fresh plant is given to animal	Sesamol, mucilage, glycerin, esters	Tick infestation, dystocia
115.	Papilionaceae *Mucuna pruriens* (Cowitch)	Sansani (H) Ufe (I) Yerenkpe (N) Werepe (Y)	Hairs	Hair decoction is given orally	Mucunine, mucunadine	Helminthiosis
116.	Papilionaceae *Lonchocarpus cyanescens* (Africa Indigo)	Malomo (H) Echin (N) Blu-yoruba (Y)	Root	Fresh root is infused and given to affected animals	Beriberine pritopine	Fascioliasis
117.	Moringaceae *Moringa oleifera* (Benoil tree)	Zogali (N) Ewelgbale (Y) Zogalli (H) Okwe-oyibo (I)	Leaves, stalks	Decoction is given to animals during labour	Moringine, minerals, protein, vitamin	Dystocia
118.	Fabaceae *Centrosema pubescens* (Spurred butterfly pea)	-	Leaves	Supplemented in feed	Saponins, tannins, terpenes	Promotes growth
119.	Composite/Asteraceae *Tridax procumbens* (Tridax)	Igbalode (Y) Biyenna blu (N)	Leaves	Feed supplement	Tannins, steroids, alkaloids, purines	Promotes growth
120.	Portulacacea *Talinum triangulare* (Water leaf)	Ofe-bake (I) Eningi (N) Gbure (Y)	Leaves	Feed	Steroidal saponins	Promotes growth
121.	Amaranthaceae *Amaranthus spp*		Leaves	Feed supplement		Promotes growth
122.	Curcubitaceae *Telfaria occidentalis* (Fluted pumpkin)	-	Leaf extract	Feed supplement	Iron, thiamine, riboflavin, nicotinamide,	Promotes growth

					ascorbic acid	
123.	Cucurbitaceae *Mormodica charantian* (Wild melon)	-	Fruits	Decoction powder is administered	Momordin, charatin, momodia, vicin, oils	Bacterial, viral and fugal infections
124.	Moraceae *Ficus exasperata* (Sand paper leaf)	Baure (H) Asesa (I) Kawusa (N) Ipin (Y)	Leaves	Decoction applied topically to the affected birds	Copper, calcium, ascorbic acid, saponin, alkaloid, phytate	Fowl fleas
125.	*Musonia altissima*	-	Leaves	Ground and mix with feed	-	Promotes growth

573 Keys: Nupe (N), Igbo (I), Yoruba (Y), Hausa (H), Fulfulde (F), - = No information
574

575 Table 2: Tropical plants that are used to treat poultry diseases in Nigeria

S/No.	Scientific, generic, species and English name(s)	Vernacular names	Part(s) used	Therapeutic regimens(s)	Phytochemical principles	Animal disease(s)
1.	Canabaceae *Cannabis indica* (Indian hemp)	Niyiwiyi (N)	Leaves	The leaves are soaked in drinking water	Tetrahydroxy cannabinol, cannabigerol, cannabidiol	Newcastle disease
2.	Solanaceae *Datura metel* (Thorn apple)	Zakami (H) Myaramuo (I) Finiga (N) Apaka (Y)	Fruits	The fruits are soaked in drinking water	Atropine, hyosiyamine,scopolamine triterpenoids	Newcastle disease
3.	*Mush not*	-	Fresh or dried aerial part	Is given to affected birds to eat	-	Newcastle disease
4.	Solanaceae *Solanum spp*	Gautan kadangare (H)	Fruits	Place the fruit in the drinking water of birds	Solanine	Newcastle disease
5.	Solanaceae *Solanum incanum* (thorn apple; Bitter apple)	Gautan kura (H)	Fruits	Put the fruit in the drinking water	Solanine	Newcastle disease
6.	Solanaceae *Solanum nodiflorum* Syn: *Solanum americanum* (Small flower night shade)	Gautan kaji (H) Nakw kunya (G)	Fruits	Put the fruit in for drinking	Solanine	Worm infestation, Newcastle disease, coceidiosis, fowl cholera
7.	Solanaceae *Capsicum frutescens* (Chilly pepper)	Barkono (H) Yakayiringo (N) Ataibile (Y)	Fruits	The powder of C. frutscens and C. annum are put in drinking water	Capsaicin, oil, ascorbic acid	Newcastle disease
8.	Legumnosae *Abrus precatorius* (Jecquirity bear)	Idon zakara (H), Eyekosun dangiy (N) Ojologbo (Y) Otoberebere (I)	Seeds	Soaked in drinking water (very toxic)	Abrin, abrine, abricin, abricine methocation, picatorine, trigonelline choline, hypaphorine	Egg production and hatch ability
9.	Solanaceae *Capsicum annum* (Bell pepper)	Atarugu (H) Ose (I) Yakako (N) Atatatase (Y)	Fruits	The powder of C. frutscens and C. annum are put in drinking water	Capsaicin	Newcastle disease
10.	Bombacaceae *Adansonia digitata* (Baobab)	Kuka (H) Muchi (N) Oshe (Y), Akpu (I)	Fruits	Powder mixed with feed	Catechins, adansonine	Fowl cholera
11.	Liliaceae *Allium sativum* (Garlic)	Tafarnuwa (H)	Bulbs	Soaked in drinking water	Alliin, allicin, sulphur, allinase	Fever

12.	Agavaceae *Aloe barteri* Syn: *Aloe vera*	Moda (H)	Leaves	Soaked in drinking water	Alion, barterin	Respiratory problems
13.	Combretaceae *Anogeissus schimperi* (Citrus)	Marke (H)	Bark	Soaked in drinking water	Flovonoids tannins	Cough, gastro intestinal disorders
14.	Fabaceae *Arachis hypogea* (Ground nut)	Gyada (H) Gusha (N) Apapa (I) Epa (Y)	Oil	Oil is given to the pomed birds to drink	Oils	Poisoning
15.	*Banderaea simplicifolia* (Abelia bread)	-	Leaves	Decoction or infusion used to bathed animals	-	Pediculosis
16.	Caesalpiniaceae *Bauhinia rufescens* (Scutch grass)	Tsatsafi (H)	Barks	It is soaked in water	-	Hepatitis
17.	Caesalpiniaceae *Bauhinia thonningii* (Camel's foot)	Kalgo (H)	Juice from young leaves	Is dropped in the affected eye	-	Conjunctivitis
18.	Burseraceae *Boswselia dalziellii* (Frankincence)	Hannu (H) Gogagi (N)	Juice, stem bark, leaves	Juice or decoction from stem bark and fresh leave is given to birds	Resin, boswellinic acid, essential oil bassorin	Coccidiosis, diarrhea, amoebiasis
19.	Solanaceae *Capsicum annum* (Bell pepper)	Ata (H) Ose (I) Ata rubu (N) Ata tatase (Y)	Fruits	Soak the fruits in drinking water	Capsaicin	Cholera
20.	Solanaceae *Capsicum frutescens* (Chillies)	Barkono (H) Yakayiringi (N) Ataibile (Y)	Fruits	Dried powdered fruits soaked in drinking	Capsaicin	Cold, diarrhea, Newcastle disease
21.	Caricaceae *Carica papaya* (Guava)	Gwanda (H) Okwere (I) Konkeni (N) Ibepe (Y)	Leaves	The moist ash of burnt leaves applied topically to lice	Cryptoxanthine, papain, palmitic, oleic, stearic, linoleic acid	Pediculosis
22.	Rutaceae *Citrus aurantifolia* (Lime)	Lemon tsami (H)	Juice	Juice and smoke from the dried peel burnt: lemon juice mixed with butter and given to birds. Juice and red potash mixed with drinking water	Flavoniods, volatile oils, vitamin C	Cold nervous disorder, insect repellant, Helminthosis
23.	Cucurbitaceae *Cucumis pustulatus*	Makaima (H)	Fruits	Fruits mixed with bran and given to birds	-	Prophylaxis, stunting growth, increase egg production
24.	Curcubitaceae	Kanfakara (H)	Fruits	Combined	-	Helminthosis

	Cucumis prophetarum (Balsam pear; Bitter guard)			fruits of C. prophetarum, C. aurantifolia, and C. quandragularis used		
25.	Vitaceae *Cissus quandranguilaria* (Bone setter)	Dodoriya (H)	Fruits	Combinations above used	Vitamin C, 3-ketosteroid, steroid 1 & 11	Helminthosis
26.	Cyperaceae *Cyperus articulatus* (Guinea rush)	Kajiji (H) Efakozhiko (N) Eni-oore (Y)	Fruits	Fruits of C. articulatus and seeds of diglomerata are groung and given	Sesqueterpenes, monoterpene	Musculoskeletal disorders, fever, poor growth
27.	Amaryllidaceae *Crinum yaccaeflorum*	Albasan kwadi (H)	Leaves	Leaves of C. yaccaeflorum with bulbs of A. sativum infusion given	-	Musculoskeletal disorders
28.	Mimosaceae *Dichrostachys glomerata* Syn: *Dichrostachys cinerea* (Sickle bush)	Yayan dundu (H)	Seeds	Combined as stated above	Tannins, alkaloids	Musculoskeletal, disorders, fever, poor growth
29.	Palmae *Elaeis guineensis*	Kwakwan manja (H) Aket (I) Ope (Y) Yikunu (N)	Oil	Oil is rubbed on the pox lessons	Lipids	Fowl pox
30.	Euphorbiaceae *Cuphorbia poissonii*	Tunya (H)	Latex	Latex is rubbed on sore, wound or any fresh cut	-	Sore, wounds
31.	Ebenaceae *Disopyros mespiliformis* (West African Ebony)	Namijin kanya (H)	Barks	Dried bark is pounded and moistened with water and placed in wounds or brings	Naphtoquinone, plumbagin, tannin, saponin, scopolin	Wound, bruises
32.	Moraceae *Ficus gnaphalocarpa* (Bush fig)	Baure (H) Baure (F)	Latex	Latex is given orally and applied topically	-	Diarrhea, fungal infection
33.	Combretaceae *Guiera senegalensis* (Dama Gazelle)	Sabara (H) Sabara (N) Geloki (F)	Roots, leaves	Latex is rubbed topically	Tannins, alkaloids catechiians	Gastrointestinal disorders
34.	Malvaceae *Hibiscus sabdariffa* (Jamaican Sorrel; Indian Sorrel)	Zoborodo (H) Emagidzuru (N) Akese (Y) Zoborodo (F)	Leaves	Leaves are burnt in poultry houses	-	Lice, tick, sked, mange flies infestation
35.	Fabaceae	Shuni (H)	Leaves	Paste is made	-	Lacerations,

	Indigofera spicata Syn: *Indigofera hendecaphylla* (Creeping indigo)			with fresh water and applied topically		swellings
36.	Meliaceae *Khaya senegalensis* (Mahogany tree)	Madachi (H) Ghyaghya (G) Kahi (F)	Barks	Decoction is made and given to birds	Limonoids, scopoletin, tannins, saponins, sterol	Coccidiosis, Emahation, amoebiasis, helminthosis, diarrehoea, Newcastle disease
37.	Curcubitaceae *Lugenaria vulgeris* (Bottle guard)	Kwarya hawainiya (H) Tumbugel (F) Bingi (N) Tangiri (Y)	Whole	The plant is dipped in drinking water	Alkaloids	Coccidiosis, Newcastle disease
38.	Lythraceae *Lawsonia inermis* (Henna plant)	Lalle (H)	Leaves	Infusion or decoction is applied topically	Lawsone, lawsonide, tannins, resin	Soft ticks, wounds, bruises
39.	Cucurbitaceae *Momordica balsamina* (African cucumber, Balsam apple)	Garafuni (H) Pylbi gwi (BR) Daddagu (H) Garafini (N) Igbole-aja (Y) Garahunii (F)	Leaves, juice	The powder is mixed with feed; mix juice with drinking water	Glutelon, albumin, globulin, aminobutyric acid	Coccidiosis, lameness, uropegeal gland inflammation in ducks, fowl pox
40.	Solanaceae *Nicotiana rustica* (Aztec tobacco)	-	Leaves	The leaf powder or oral is applied topically	Nicotine	Tse- tse flies, lice, tick, mange mite infestations
41.	Mimosasea *Parkia filicolidea* Syn: *Parkia biglobosa* (Niffa)	Dorowa (H) Ogirili (I) Lonchi (N) Iru, Igba (Y)	Bark	Bark is placed in drinking water	Tannins, saponins, alkaloids	Newcastle disease
42.	Rubiaceae *Sarcocephalus esculentus* Syn: *Nuclea latifolia* *Sarcocdphalus latifolia* (African peach)	Tafashiya (H) Gbashi (N) Egbesi (Y)	Bark	Bark is placed in drinking water	Naufoline, Augustine tannin, saponine	Gastro intestinal disorders
43.	Solanaceae *Schwenkia americana* (Baobab)	Dandana (H) Kabi-malam (N) Ojuisin (Y)	Leaves	Infusion or decoction is applied topically	Glycoside, schweikioside	Eye infection
44.	Polygalaceae *Securidaea longepeduneulata* (Violet tree)	Sanya (H) Jechi (N) Kyiritoo (Y)	Roots	Decoction or infusion is given orally	Saponin, glycosides, oleanoic acid, tannins, valerianate methyl salicylate	Cold
45.	Bignoniaceae *Stereospermum*	Sansani (H) Jiri (H) Erumyeye	Bark	Ash is given to birds	-	Poisoning

	kunthianum (Kunth's Stereospermum)	(Y) Dagba panbochi (N)				
46.	Compositae/Asteraceae *Vernonia amygdalina* (Bitter leaf)	Shiwaka (H)	Leaves	Infusion is given to bird; Root is toxic	Vernonin, vernolepin, vernomygdin	Diarrhea, worms infestation
47.	Fabaceae *Zornia diphylla* Syn: *Zornia glochichiata* (Umbrella sedge)	Sabulun salo (H) Ebayikan ego (N) Eti-ekute (Y)	Fruits	Steep in water and given to birds	-	Gastrointestinal disorder
48.	Annonaceae *Annona senegalensis* (Sour sop)	Gwandan daji (H) Uburu-ocha (I) Nigberechi (N) Labo (Y)	Roots	Decoction given orally; A. senegalensis, K. senegalensis and V. amygdalia roots can be decocted and give orally (Synergian)	Anonaine, tannins	Helminthosis
49.	Combretaceae *Combretum peniculatum* (Blood wort; Thousand leaf)	-	Roots	Decoction is given to birds	Alkaloids, tannins, flavonoids, phenols, saponins, steroids	Salmonellosis caused by S. pullorum and S. gallinarum
50.	Loranthaceae *Tapinanthus dodoneifolius* (Goat weed)	-	Leaves	Infusion or decoction is given to birds	Alkaloids, tannins, flavonoids	Salmonellosis caused by S. pullorum and S. gallinarum
51.	Combretaceae *Terminalia avicenoides* (Grain of Salim)	-	Stem bark	Decoction with potash is given to birds	Arjunolic acid, α-amyrin, 2,3,23-trihydroxyolean-12-ene	Helminthosis
52.	Liliaceae *Allium cepa* (Onion)	Albasa (H) Ghipa (G) Alubosa (I) Lubasaa (N) Alubosa (Y)	Bulbs	Sliced bulbs are dropped in drinking water. Green leaves are also given	Sulphur compounds, alliin, allocin, alliinase	Helminthosis
53.	Vitaceae *Cissus polpunea* (Veld grape)	Dafara (H) Goloyi (G) Korolambawo (N) Ajawa (Y)	Leaves, roots	Powder leaf or root is put in drinking water	Alkaloids, flavonoids, saponins, tannins	Prophylaxis, coccidiosis
54.	Arecaceae *Dentel betel* (Areca nut; Betel nut)	Hankatayaro (H)	Fruits	Fruits are sliced and put in drinking water for birds	Chavibetol, chaicol, estragole, eugenol, cadinene, -lactone, ursolic acid, cadinene, carvacrol	Fowl typhoid coccidiosis, prophylaxis
55.	Moringaceae *Moringa oleifera* Syn: *Moringa pterygosperina* (Moringa tree)	Zogale (H) ladignayi (G)	Bark, root bark	Soak stem or root bark in drinking water	4 hydroxymellein, sitosterone, β-sitosterol, oclacosanoic acid, vitamins, behenic, lignoceric, myristic	Helminthosis, prophylaxis

					acids, ptergospermin, vamillin	
56.	*Nauclea latifolia* Syn: *Sarcocephalus latifolia* (Pin cushion tree)	Tafashiya (H) Kutugbarayi (G)	Stem, root bark	Soak stem or root bark in drinking water for birds	Saponins, flavonoids, alkaloids, tannins, cyanide, phylate, oxalate	Helminthosis
57.	Scrophulaceae *Striga hermontheca* (Witch weed)	Makasa (H) Gogai (G) Edo (N)	Whole plant	Pound and mix the whole plant with drinking water	Flavonoids, tannins, saponins, cardiaglycosides, terpenes, sterols, alkaloids, coumarins	Coccidiosis, dysentery, prophylaxis
58.	Verbenaceae *Vitex diniana* (Blackplum)	Dinya (H) Jiyi (G) Dinchi (N) Oriri (Y)	Leaves	Cooked leaves with cereals given every day for 3 weeks	Aryl glycoside	Coccidiosis, prophylaxis
59.	*Epiphyllum truncatum* (Cactus)	Magabai (G)	Stem	Stem cut into drinking water	-	Newcastle disease, Coccidiosis,
60.	Sapotaceae *Butyrospernum paradoxum* Syn*: Vitellaria paradoxa* (Shea butter tree)	Kade (H) Koyi (G) Osisi (I) Ori (Y) Kochii (N)	Barks	Drop fresh bark in drinking water	Fixed oils, alkaloids	Coccidiosis, fowl pox
61.	Caesalpiniaceae *Afzelia africana* *(Counter wood tree;* (Mahogany bean)	Kawo (H) Akpald (I) Bachi (N) Apa (Y)	Leaves	Infusion or decoction given to birds	Alkaloids, tannins	Helminthosis
62.	Bombacaceae *Adansonia digitata* (Baobab tree)	Kuka (H) Akpu (I) Muchi (N) Oshe (Y)	Root	Decoction is given for drinking	Adansomine, catechina, flavonoside, ascorbic acid	Coccidiosis
63.	Meliaceae *Azadirachta indica* (Neem tree)	Niimu (N) Dogon yaro (I) Dogonyaro (H) Wahe (F) Okeoyinbo (Y)	Leaves	Decoction is given to birds	Azadirachta, nimbin, nimbolide, salanine meliacin	Helminthosis
64.	Rhamnaceae *Parinary polyandra* Syn: *Maranthes polyandra*	Kura (H)	Leaves	Decoction is given in drinking water	Phosphorus, calcium, magnesium, potassium	Coccidiosis
65.	Anacardiaceae *Mangifera indica* (Mango)	Mangoro (H) Mangolo (I) Mungoro (N) Mangoro (Y)	Roots	Roots soaked with salt is given	Quercetin, resins, tannins, vitamins A, B & C complex	Helminthosis
66.	Annonaceae *Annona squamosal* (Sugar apple)	Kiribombo (N)	Seed	The powder is mixed with water and applied	Acrid principle, anonaine, roemerine, noreorydine,	Pediculosis, insect infection, cancer

				topically	corydine, norisocorydine, isocorydine	
67.	Legumnosae *Tephrosia vogellii* (Fish bean, Fish poison bean)	-	Seed	The powder is mixed with water and applied topically	Tephrosin, isotephrosin	Pediculosis
68.	Apocynaceae *Adenium obesum* (Desert rose)		Leaf	The decoction applied topically	-	Tick infestation

576 Keys: Hausa (H), Nupe (N), Gwari (G), Fulfulde (F), Yoruba (Y), Baribari (BR), Igbo (I),
577 - = Unknown
578

579 Table 3: Tropical plants that are used to treat small animal diseases in Nigeria

S/No	Scientific aqueric specie names	Vernacular names	Part(s) used	Therapeutic regimen	Phytochemical principles	Animal disease(s)
1.	Brassicaceae *Brasica juncea* Syn: *Brassica nigra* (Mustard)	-	Oil	The oil is rubbed in affected part	Allyl mustar oil, crotonyl mustard oil, allyl cyanide, dimethyl sulphide	Psoroptic mange
2.	Palmae *Elaeis guinensis* (African oil palm)	Kwakwa (H) Ake (I) Yikunu (N) Ope (Y)	Oil	The oil is rubbed in affected part	Lipids	Psoroptic mange
3.	Rutaceae *Citrus aurantium* (Lime of Mecca, (Lago mahogany, African mahogany)	Lemuhi (F) Lemun makka (H) Lemun nasara (N)	Fresh peels	The oil of E. guinensis is rubbed followed by rubbing of fresh peels.	Vitamin C	Psoroptic mange
4.	Meliaceae *Khaya ivorensis*	-	Oil	The oil from the seed is rubbed in affected part.	Anthocyanins, flavonoids, steroids, tannins, phlosatanins anthraquinones saponins	Mange, dermatophylosis
5.	Malvaceae *Sida carpinifolia*	-	Leaves		-	Skin parasitic infections
6.	*Butyrospermum paradoxum* (Shear butter tree)	Kadanya (H)	Nuts	Nuts are burnt and the smoke repel insects	Oil	Insect infestation
7.	Burseraceae *Canarium schwaeinforthi* (False walnut)	Atile (H) Mbiji (I) Esha (N) Origbo(Y)	Wax	Wax is rubbed and repel insects	Saponins, resins, tannins, amyrin, limonene, phellandrine	Insect infestation
8.	Combretaceae *Guiera senegalensis* (Egyptian Minosa)	Sabara (H) Sabara (N)	Leaves, twigs	Leaves and twigs are burnt and the smoke repel insects	Catechina, alkaloid, tannins	Insect infestation
9.	Lamiaceae *Hyptis specitigera* (Bush mint; Black sesame)	-	Whole plant	Whole plant is burnt and smoke repel insects	Oil	Insect infestation

10.	Rutaceae *Citrus aurantifolium* (Sour orange) (sour lime)	Lemun tsani (H) Afofanta (I) Lemun bakogi (N) Orombowewe (Y)	Peels	Dried peels are burnt and the smoke repel insects	Flavonoids, vitamin C, essential oils	Insect infestation
11.	Mimosaceae *Sosbaria aculeate* (Niffa)	Alambu (H)	Leaves	Infusion of pounded leaves repel tsetse fly		Tsetse fly infestation
12.	Bombacaceae *Adansonia digitata* (Baobab tree)	Kuka (H) Akpu (I) Muchi (N) Oshe (Y)	Leaves	The leaves are burnt and the smoke repel insects	Adansomine, catechins, ascorbic acid	Insect infestation
13.	Fabaceae *Amblygonocarpus andongensis* (Iron wood)	Kolon itche (H)	Stem bark	The powder decoction is given to obese rats	Alkaloids, saponins, cardiac glycosides	Obesity
14.	Curcubitaceae *Curcumis sativus* (Cucumber)	Kokumba (N) Kokunba (H)	Fruits/seeds	Decoction is given to lab animals to drink	Iron	Anaemia, constipation
15.	Papillionaceae *Abrus precatorius* (Jecquirity bean)	Idon Zakara (H)	Leaves, leaf and seeds are toxic	Decoction is given to affected rodents;	Abrin, abrine, abricin, abricine	Malaria, anaemia
16.	Meliaceae *Azadiradita indica* (Neem tree)	Niinu (N) Dogonyaro (H) Dogon yaro (I) Oke oyinbo (Y)	Leaves	Decoction is given to affected animals	Nimbin, salnin nimbolide, nimbidin, meliacine diterpenes	Malaria in rodents
17.	Labiatae *Ocimum basilicum* (Sweet basil)	Efirin (Y) Dagoya (H) Inchianwu (I)	Leaves	Infusion is used	Alkaloids, flavonoids, phenols, coumarins, tannins, saponins, phytosterols	Hypertension
18.	Ganodomataceae *Ganoderma lucidum* (Ganoderma)	Tuwon biri (H) Eyangici kana (N)	Fruits	Decoction given to cat	Glycosides, saponins, flavonoids, alkaloids	Inflammation

19.	Malestomataceae *Dissotis theifolia* (Trailine Dissotis)	-	Stems	Methanolic extract is administered topically	Saponins, tannins, glycosides, flavonoids, terpenoids, alkaloids, steroids	Staphylococcal infection, wound
20.	Lamiaceae *Ocimum gratissimum* (Basil fever plant)	Nehonwu (I) Efirin (Y) Tamotswagi wawaci (N)	Leaves	Methanolic extract applied topically	Thymol, eugenol, camphor, carryophylline	Wound antiseptic
21.	Euphorbiaceae *Phyllantus amarus* Stone brea	Alambu (H) Debi-sowo (Y) Sunyesboro sunzuma (N)	Whole plant	Aqueous extract is administered orally	Tannins, flavonoid, glycoside, inulin	Wound
22.	Icacinaceae *Pyrenacantha staudtii*	-	Roots	Aqueous extract administered orally	Glycosides, saponins, alkaloids, flavonoids	Ulcer

Keys: Hausa (H), Nupe (N), Gwari (G), Fulfulde (F), Yoruba (Y), Baribari (BR), Igbo (I),
- = Unknown