



Indigenous Preparation Methods of Medicinal Plants Used for the Treatment of Small Ruminant Diseases in Imo State, Nigeria

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Abstract

The study examined the use of medicinal plants for the treatment of small ruminant diseases in Imo State, Nigeria. A multi-stage sampling procedure was used to select 120 small ruminant farmers for the study. A structured interview schedule was used to collect data. Data were analysed using mean and percentages. Retained placenta (82%), pneumonia

(82%), foot rot (82%) and helminthosis (81%) were the common diseases of small ruminants in the area. Available medicinal plants were *Garcinia kola* (93%), *Ageratum conyzoides* (92%), *Costus afer* (91%) and *Vernonia amygdalina* (80%). Many medicinal plants were used in the treatment of more than one small ruminant disease. Roots (98%), leaves (98%), juice (93%) and stems (91%) were the highly used plant parts for the preparation of the remedies. Squeezing (98%), mixing with palm oil (97%) and pounding (91%) were the highly used preparation methods for herbal remedies by the farmers. The study concluded that medicinal plant species were used for the treatment of small ruminant diseases in the study area. Therefore, the government and other relevant stakeholders should promote the use of medicinal plants for the treatment of small ruminant diseases.

Introduction

Livestock contributes 40% of the global value of agricultural output and supports the livelihoods and food and nutrition security of nearly 1.3 billion people. It also plays a crucial role in sustainable food systems (source of manure, and farm power) and is an important asset for vulnerable communities (World Bank, 2021). Abay and Jensen (2020) stated that about 500 million pastoralists globally depend on livestock herding for food, income, store of wealth and collateral or safety net in times of need. The livestock sector can thus be seen as the backbone of the global food system and support to poverty reduction, food security and agricultural development. The livestock sub-sector contributes 9% - 21% of the gross domestic product (GDP) from the agricultural sector and is vital to socioeconomic growth and food security in Nigeria (Federal Ministry of Agriculture and Rural Development, 2020). According to the Commonwealth Scientific and Industrial Research Organization (CSIRO) (2020), Nigeria has the largest small ruminant herds in Africa. It noted further that the country has about 73.8 million goats and 42.1 million sheep which are mainly indigenous breeds. The livestock sub-sector contributed ₦221.13 billion (5.6%) to the country's GDP in the first quarter (Q1) of 2023 (Central Bank of Nigeria, 2023). Small ruminants (sheep and goats) occupy a significant proportion of livestock produced in Nigeria where they are reared mainly for meat, milk, skin and wool (Oni, Ibaze, Ogunwande & Onibi., 2022; Yusuf, Aruwayo, & Muhammad, 2018).

Oni et al. (2022) noted that farm animals are mostly managed on the free-range/extensive and semi-intensive systems in the Nigerian agricultural system. Consequently, animals become exposed to diseases since they are not properly taken care of. Diseases according to Ahmed, Yoder, De Glanville, Davis, Kibona, Mmbaga, Lankester, Swai and Cleveland (2019) can reduce the contributions of the livestock sector to the economic development of the country. Therefore, controlling livestock diseases becomes necessary to improve the contributions of the sector to the economy.

The shortage of veterinary staff, rising costs and increasing concern about development of drug-resistant parasites and tissue residues of chemotherapeutic agents undermine the use of modern veterinary medicine in developing countries (Chadwick, 2021; Awalu, Manu and Manu, 2020). Resultantly, farmers in many parts of Africa turn to the use of traditional veterinary medicine (Kuralkar & Kuralkar, 2021; Rahman, Ijaz & Bussman, 2022).

Bareetseng (2022) stated that about 70 - 80% of the African population rely on plants for the treatment of human and livestock diseases. This is because they are easily

accessible, affordable, economically feasible and culturally appropriate (Chakale, Asong, Struwig, Mmanza & Aremu, 2022). Based on their importance, Eiki, Sebola, Sakong, and Mabelebele (2021) suggested the conservation of herbal plants for future generation. Achieving this will require identifying plants that have medicinal values, the parts used, the diseases they treat and the preparation methods for herbal remedies (Asfaw, et al, 2022; Jayalath, et al., 2019).

Nnadi, et al. (2012) reported the use of medicinal plants in the treatment of livestock diseases by farmers in Imo State, Nigeria. It was however observed that the study did not identify the plant parts used and their methods of preparation by the farmers. Also, the study was not restricted to small ruminants but focused on livestock generally. This makes it difficult to identify the specific medicinal plants used in the treatment of small ruminant diseases in the area and how they are locally prepared.

Animal diseases and medicinal plants used for their treatment differ across the globe, so also their nature, frequency and methods of preparation and administration can change in respect of geography, time and knowledge (Karakaya, Polat, Aksakal, Sumbullu & Incekara., 2020). Also, as numerous plant species are endangered as a result of the rapid urbanization resulting from population growth and the absence of conscious efforts to protect them in developing countries (Raus, Costa & Bered, 2022; Oko, Odey & Anake, 2022; Yu, Aruwayo & Muhammad, 2021), there is need to identify the ones that are still available, how they are prepared and what diseases they treat. There is therefore the need to document the plant species used in the treatment of small ruminant diseases and their preparation methods in Imo State, Nigeria.

The broad objective of the study was to examine indigenous preparation methods for medicinal plants used in the treatment of small ruminant diseases in Imo State, Nigeria. The specific objectives were to:

1. identify prevalent small ruminant diseases;
2. ascertain plant species used for the treatment of small ruminant diseases;
3. identify the plant parts used for the treatment of small ruminant diseases; and
4. ascertain indigenous preparation methods for the herbal remedies.

Methodology

The study was carried out in Imo State, Nigeria. It is located between latitude 5° 10'N – 6° 00' N and longitude 6°40' E – 7°23' E (www.mapcarta.com/Imo_state). The population for the study comprised all small ruminant farmers in selected local government areas of Imo State. Multi-stage sampling procedure was used to select the sample for the study. A reconnaissance survey was first conducted to identify the areas of the state with a large number of small ruminant farmers. Consequently, four local government areas (LGAs) namely Orlu, Okigwe, Isiala Mbano and Ehime Mbano were purposively selected because of the abundance of small ruminant farmers. Two autonomous communities were selected from each of the LGAs using a simple random sampling technique to give a total of eight communities. From each of the communities selected, 15 small ruminant farmers were randomly selected, making a sample size of 120 respondents.

Data were collected using structured interview schedule. The instrument was validated using face and content validity method. This was achieved by giving the instrument to three lecturers in Crop Science, Animal Science and Veterinary Medicine. Any item approved by them was taken as valid. The prevalent diseases in the area were identified by asking the farmers to indicate the symptoms manifested by their animals. The indicated symptoms were matched against causal diseases, with the help of a veterinary doctor. A disease with a percentage score $\geq 70.00\%$ was considered prevalent in the area (a modification of classification by Asadu, Chah & Igbokwe, 2019). Medicinal plant species used for the treatment of small ruminant diseases in the area were identified by listing names (local, scientific and English) of medicinal plant species obtained from the internet and books on weed science. The farmers would indicate the plant species used for treating the symptom(s) which are later matched with the causal disease(s). Indigenous preparation methods were ascertained by listing the various traditional methods used in preparing herbs and asking the farmers to indicate the ones they used. Data were analysed using percentages.

Table 1: Sample of small ruminant farmers in Imo State

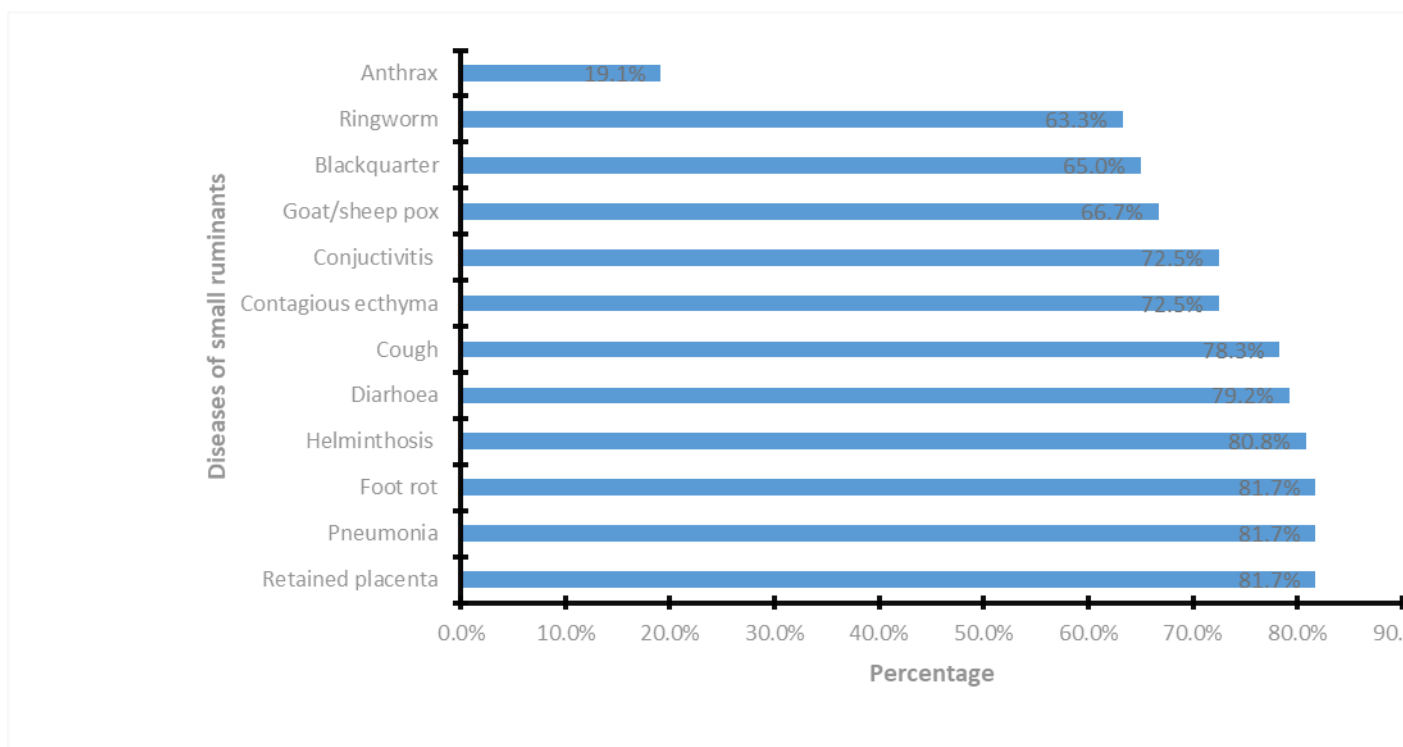
LGA	Communities	Farmers
Ehime Mbanano	Umueze, Umunomo	30
Isiala Mbanano	Ibeme, Oka	30
Okigwe	Amuro, Umulolo	30
Orlu	Ihioma, Okporo	30
Total		120

Results and Discussion

Prevalent Diseases of Small Ruminants

Results in Figure 1 show that retained placenta (81.7%), pneumonia (81.7%), foot rot (81.7%) and helminthiasis (80.8%) were the prevalent small ruminant diseases in the study area. Other diseases of small ruminants in the area included diarrhoea (79.2%), cough (78.3%), conjunctivitis (72.5%) and contagious ecthyma (72.5%). Proper identification of livestock diseases is necessary for selecting the right plant species for treatment. Bolajoko, Gool, Peters, Martinez, Vance and Dungu (2020) reported foot rot, sheep/goat pox and helminthiasis as common diseases of livestock in Nigeria. Similarly, Babagana and Musa (2023) found that mastitis, anthrax, foot rot and ring worm were the common diseases of goat in Nigeria.

Diseases increase can cause mortality and reduction in the quality of products which will reduce the profitability of small ruminant production in the area. The cost of treating sick animals imposes more financial burden on farmers. For example, diseases can reduce milk yield and shorten lactation period in female animals (Duguma, 2020). Abu et al. (2020) asserted that endemic livestock diseases have devastating effects on the livestock industry leading to severe losses. Production gaps in the Nigerian livestock sub-sector is attributed to diseases (Federal Ministry of Agriculture and Rural Development, FMARD, 2020). The economic losses associated with animal diseases can translate to increased poverty and food insecurity among livestock-dependent households (Molina-Flores & Manzano, 2020).



Field Survey, 2023

Figure 1: Prevalent diseases of small ruminants

Medicinal Plant Species Used for the Treatment of Small Ruminant Diseases

Table 2 presents 19 medicinal plants available for the treatment of small ruminant diseases in the area. The most used medicinal plant was *Garcinia kola* (92.5%) followed by goat weed (*Ageratum conyzoides*) (91.7%) and *Costus afer* (90.8%). The result further reveals that some plant species were used for treating more diseases than others. It was however found that African spinach (*Amaranthus hybridus*), Indigo tree (*Indigofera tinctoria*) and Mango (*Mangifera indica*) were the only plant species that were used in treating only one disease. The result also shows that different plant species were used in treating the same disease. It may be that the plants have similar therapeutic properties.

The use of different medicinal plants in treating the same livestock disease may reduce pressure on the use of a particular plant species thus conserving biodiversity. This may reduce the overharvesting of plant species since a specific disease can be treated using different plant species. It can also allow for the combination of more than one plant species in the formulation of herbal remedies to enhance efficacy. Adeniran, Toba and Ajagbonna (2020) confirmed that one plant can be used to treat different livestock diseases.

Li, Odedina, Agwai, Ojengbede, Huo and Olopade (2020) observed that over 81.6% of Nigerians rely on traditional medicine for the treatment of both human and animal diseases. Fasae and Adenuga (2018) reported 11 plant species used in the treatment of sheep and goat diseases in Ogun State, Nigeria. The availability of a variety of medicinal plants for treatment of small ruminant diseases in the area could increase accessibility of the plants and thus reduce disease burden on the animals. It

could also promote biodiversity by reducing over use of a particular plant specie for the treatment of livestock diseases since many plant species can be used to treat a particular disease.

Table 2: Medicinal plants used for the treatment of small ruminant diseases

Plant species	Diseases used to treated	Percentage (n = 120)
Bitter kola (<i>Garcinia</i>)	Foot rot, ticks, diarrhea, goat/sheep pox,	92.5
Goat weed/ulanjula	Helminthosis, anthrax, pneumonia, blackquarters,	91.7
Opete (<i>Costus afer</i>)	Blackquarters, foot rot, retained placenta,	90.8
Bitter leaf (<i>Vernonia</i>)	Helminthosis, anthrax, pneumonia, foot rot,	85.0
Neem (<i>Azadirachta</i>)	Contagious ecthyma, anthrax, blackquarters, foot	83.3
Utazi (<i>Gangronema</i>)	Helminthosis, anthrax, pneumonia, blackquarter,	83.3
Siam weed	Helminthosis, foot rot, cough, ringworm,	83.3
Lime (<i>Citrus</i>)	Helminthosis, contagious ecthyma, pneumonia,	80.0
Alligator pepper	Pneumonia, blackquarter, foot rot, diarrhea,	75.0
Black pepper (<i>Piper</i>)	Contagious ecthyma, pneumonia, diarrhea,	74.2
Scent leaf (<i>Ocimum</i>)	Helminthosis, contagious ecthyma, anthrax,	72.5
Indigo tree/uri	Contagious ecthyma,	72.5
Canwood/abosi	Foot rot, diarrhea, retained placenta, cough,	65.0
Pawpaw (<i>Carica</i>)	Helmintosis, contagious ecthyma, anthrax,	63.3
Guava (<i>Psidium</i>)	Anthrax, pneumonia, blackquarter, diarrhea,	58.3
Lemon grass	Contagious ecthyma, anthrax, blackquarter, foot	55.8
Moringa (<i>Moringa</i>)	Anthrax, blackquarter, foot rot, diarrhea, retained	52.5
African spinach	Diarrhea	42.5
Mango (<i>Mangifera</i>)	Pneumonia	41.7

Field Survey, 2023

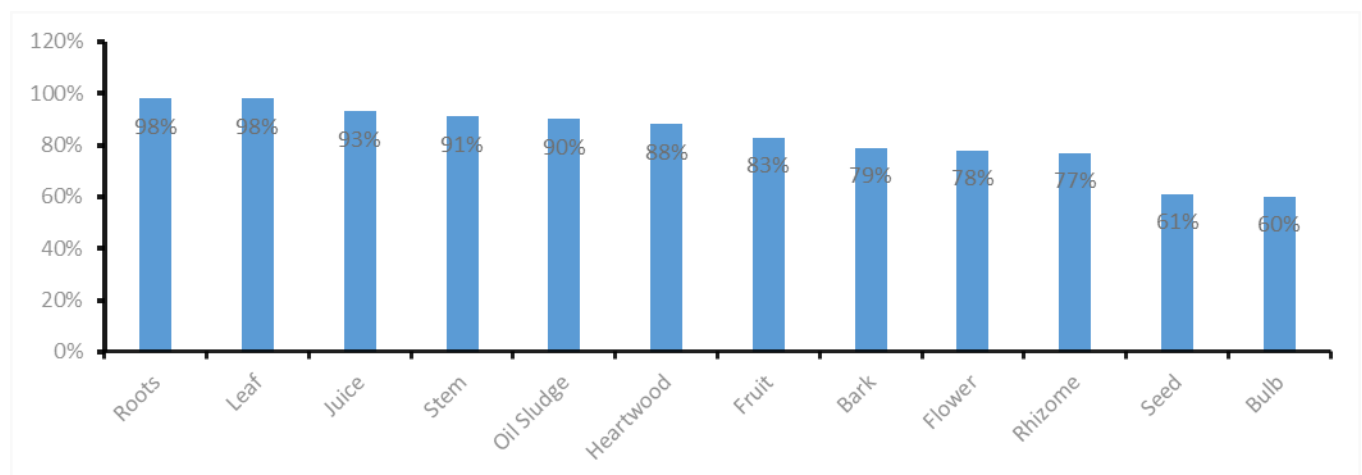
Plant Parts Used in the Preparation of Herbal Remedies

Figure 2 shows that the most used plant parts were roots (98%), leaves (98%), juice (93%), stem (91%) and oil sludge (90%). Others were heartwood also known as central wood (88%), fruit (83%), bark (79%), whole plant (78%) and seed (61%). This suggests that almost all plant parts are useful in the preparation of herbal remedies against small ruminant diseases. This could mean that active ingredients required for the treatment of animal diseases are available in all the plant parts. Ikponmwosa, Oluyomi and Olarewaju (2020) confirmed that plant parts accumulate important natural phytochemicals which possess pharmaceutical potential. However, the dominance of some plant parts such as leaves and roots in preparing herbal remedies may be an indication of the presence of higher concentrations of active ingredients on those parts. Ikponmsowa et al. (2020) link the dominance of leaves to their being the primary site of photosynthetic and biosynthetic activities in plants which leads to the accumulation of bioactive molecules such as alkaloids and tannins.

It might also be linked to the ease of extraction of the active ingredients from those parts. Ikponmwosa et al. (2020) stated that plant parts like leaves are readily available and hence easily accessible and can be harvested in large quantities for

use. Also, harvesting leaves does not exert much strain on plant regeneration and does not extensively harm the plant compared to the use of stem barks, roots and whole plant. Moges and Moges (2021) reported that plant parts like leaves, roots, fruits, bulbs, barks and flowers have medicinal value. They hinted further that two or more of the parts can be combined in the formulation of herbal therapies. Ikponmwoşa et al. (2023) reported the use of different plant parts like stem, roots, leaves and barks in the formulation of herbal remedies in Nigeria.

It should be noted that the use of all parts of plants in the treatment of livestock diseases might pose a danger to biodiversity conservation as the plants would die off when essential parts are removed. Though this may not apply to all medicinal plants as only a few parts are used. Kappor, Kaur, Sharma, Kaur, Kaur, Batra and Rani (2020) in their study on *Citrullus colocynthis* found the active ingredients to be present in all parts of the plant.



Source: Field Survey, 2023

Figure 2: Plant parts used for preparation of the small ruminant diseases

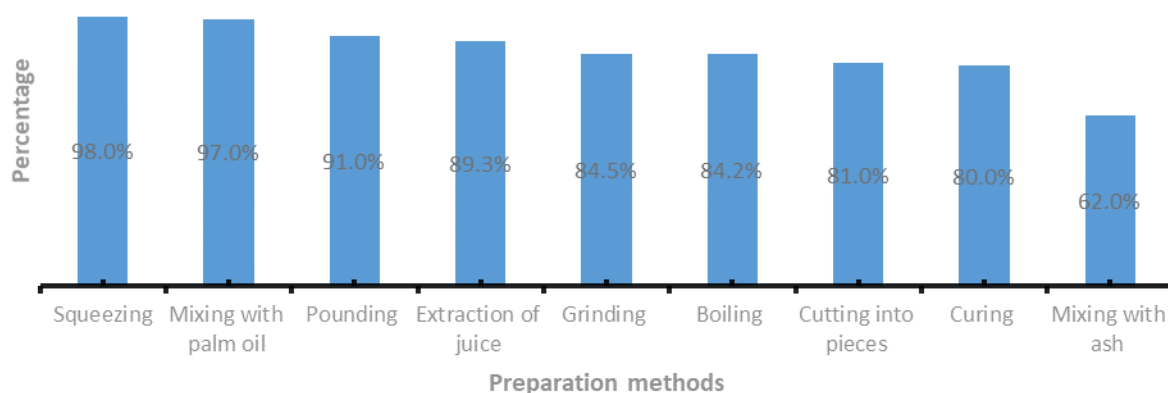
Indigenous Preparation Methods of Herbal Remedies

Results in Figure 3 shows that squeezing (98.0%), mixing with palm oil (97.0%), pounding (91.0%) and extraction of juice (89.0%) constituted the highest type of preparation methods of herbal remedies by the farmers. This was followed by grinding (84.5%), boiling (84.0%), cutting into pieces (81.0%), curing (80.0%) and mixing with ash (62.0%). The high use of some preparation methods could be associated with the ease of extracting the active ingredients from the plant parts.

The method of preparation used might depend on the active ingredient needed, the type of plant and the method of administration. Relying on indigenous knowledge which has subsisted over time, the farmers would have known methods of preparing and administering particular medicinal plants for effective results. Each preparation method has peculiar advantages and the choice of the preparation method could be influenced by the aim of the farmer.

Though, the preparation methods may vary across geographical locations, the major emphasis remains on the extraction of the active substance from the plants

(Tlemcani et al., 2023). This may have been influenced by culture as technologies and practices can be handed from one generation to another.



Field Survey, 2023

Figure 3: Methods of preparation of medicinal plants

Conclusion and recommendations

Retained placenta, pneumonia and foot rot were the most prevalent small ruminant diseases. A diversity of medicinal plant species was used for the treatment of small ruminant diseases. Roots, leaves, juice and stems were the highly used plant parts in the preparation of herbal remedies. It was also shown that squeezing, mixing with palm oil and pounding constituted the highly used methods of preparation of the remedies. It is therefore recommended that the government and other relevant stakeholders should promote the use of medicinal plant species for the treatment of small ruminant diseases.

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