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RETROSPECTIVE STUDY FROM 2018 – 2022 ON COMMONLY USED ANTHELMINTIC DRUGS OF RUMINANT ANIMALS IN THREE MAJOR VETERINARY CLINICS IN MAIDUGURI, BORNO STATE, NIGERIA

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Abstract

A retrospective study was conducted on 6877 Anthelmintic drugs collected from case registration books prescribed in the last five years from January 2018 to December, 2022 at three veterinary facilities namely: University of Maiduguri Veterinary Teaching Hospital, Frovet Veterinary Clinic and Sen. (Dr) Ali Modu Sheriff Veterinary Hospital in Maiduguri,Borno State. Descriptive statistics were used to analyzed the data collected and results were presented in charts and tables. The variables analyze include species; clinic, date, sex, age of the animals, the type of diagnosis, forms of drugs and route of administration following prescriptions. Out of the total data collected on anthelmintics used (6877), 2380 (35.0%) were rationally prescribed while 4498(65.0%) were irrationally prescribed to treat animal diseases that were tentatively diagnosed as non-parasitic cases.The study also revealed that the commonly used anthelmintic during the period under review in thethree facilities were Albendazole (47.9%), Ivermectin (45.6%)and Levamisole (6.5%)whichwere frequently prescribed during raining than in dry seasons.The findings also revealedthe problems of misdiagnosis, repeated use of the same class of anthelmintics especially benzimidazole and ivermectin group for long periods. Therefore, sound veterinary diagnosis before considering the use of anthelmintics therapeutic agents and rotationally use between classes should be practiced to minimize cases of antihelmintic resistance.

Keywords: *Antihelminths, Benzimidazoles, Levamisole, Ivermectin, Livestock, Ruminants*

INTRODUCTION

Livestock such as ruminants (including cattle, sheep and goats) farming is among the major sectors representing a valuable asset in both traditional and modern agriculture in Sub-Saharan Africa [1], as well as in other tropical and subtropical regions of the world providing animal protein, milk and beef during festivities around the world, flexible income for leather production, farm energy [2] and [3].

Nigeria is Sub-Saharan Africa's largest livestock producer, with a population ofapproximately 17 million cattle, 34.5 million goats and 21.2million sheep, the most of which are concentrated in the country's northern area [4, 5] and the Livestock industries are essential to the country's economy. It is an important source of income and livelihood for the vast majority of Nigerians who live in rural areas, accounting for around 5.2% of the national GDP. Helminthes infestations result in economic losses due to reduced productivity, weight and fertility decrease, as well as decrease carcass quality. Zoonotic helminthes from livestock can create health problems in humans there by constituting public health challenges [6].

Zoonotic helminthes are a group of complex multicellular eukaryotic parasites that infect both animals and humans, resulting in zoonosis. This category of parasites generates significant economic and public health challenges in many resource-constrained areas around the world. In Nigeria, for example, these issues are exacerbated by inadequate veterinary and medical treatment, as well as ineffective disease control programmes, among other causes [7]. Parasite helminths are classified into two phyla;nemathehelmithes, which are nemathodes or round worms such as Haemonchus, Bonostomum, Oesophagostomum, and Chabertia, and platyhelminthes, which include cestodes (e.g. Avitellina, Moniezia, Stilesia, and Taenia) and trematodes such as Dicrocoelium, Eurythrema, Fasciola, and Paramphistomum etc. These parasites can be transmitted through the eating of parasitic eggs and ineffectual larvae on contaminated grass, water, skin penetration, transplacental, arthropod, and gastropod intermediate hosts [8].

Anthelmintics are medications that lower parasite burdens on hosts to a manageable level by killing, inhibiting, or paralyzing the parasites [9] and could also diminish the accumulation of infective worm larvae on pasture and eggs in the environment [10]. The ''ideal'' anthelmintic should have a broad spectrum of activity against mature and immature parasites (including hypobiotic larvae), be easy to administer to a large number of animals, have a wide margin of safety and be compatible with other compounds, have no unpleasant side effects, and be capable of economic integration and management [11].

METHODOLGY

Data collection

The data collected for this study includes: Data presented, species, sex, age, diagnosis, route of administration, type of anthelmintic used, forms of drug and type of diagnosis, all from case record books of the three veterinary facilities in Maiduguri metropolis.

Data Analysis

Data obtained from the records were collated and entered into Excel® spreadsheets, 2016 (Microsoft Corporation, USA). Descriptive statistics were used in calculating all variables in the forms of frequencies and percentages and the results presented in charts and tablesusing Microsoft Excel® (2016).

Results

The results revealed that irrational motivation was largely responsible for anthelminthic administration in 65% of the cases handled in the study area while Rational behaviour was involved in 35% of anthelminthic use in the study location (Figure 1).

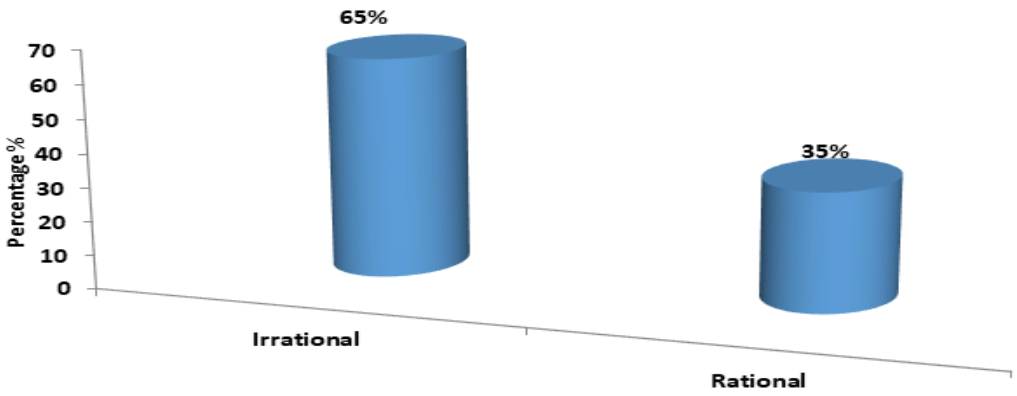

Figure 1: Prescription rate pattern of anthelmintic drugs usedin the three Veterinary facilities under review between 2018 - 2022

Classes of Anthelmintic Drugs used in the Study location within the duration (2018-2022)

The stuy recorded that 47.9% of albendendazole, 45.6% ivermectin and 6.5% levamisol were routinely employed for treatment of worm burden in ruminants from Maiduguri town within the period under study (Figure 2).

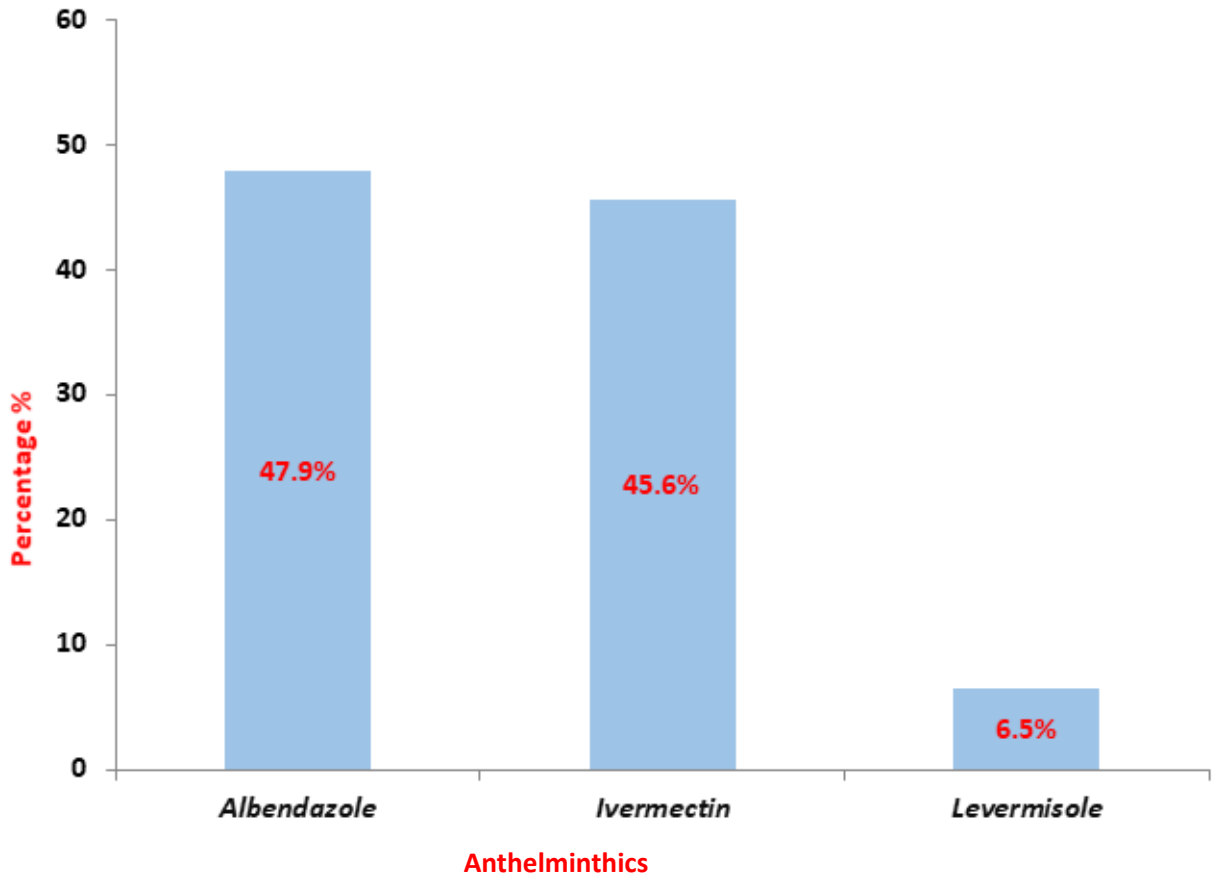

Figure 2: Comparison of the Classes of anthelmintics used in the Study location within the duration (2018-2022)

Annual frequency of anthelmintics used in Study location from 2018-2022

In 2018, anthelmintics were administered to ruminants at a frequency of 1442 relative to 902 in 2019, 1533 in 2020, 1589 in 2021 and a frequency of 1412 in 2022. Anthelmintic drugs use had the highest frquency in 2021 with a value of 1589 but was abysmally lowest in 2019 having a frequency of 902 when compared to others (Figure 3).

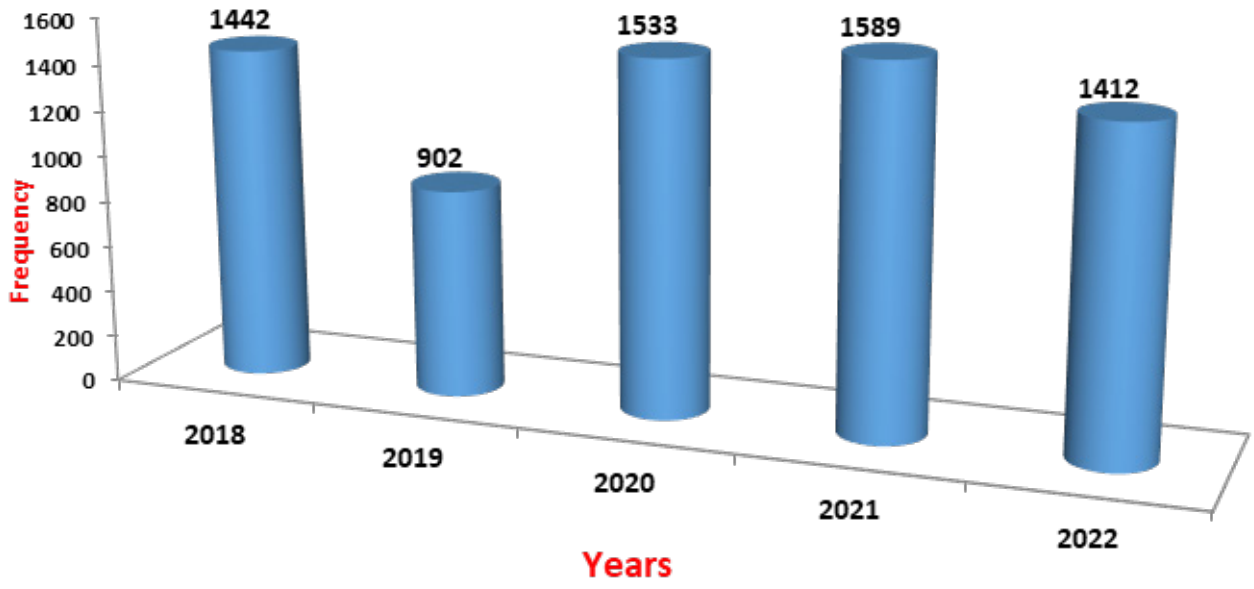

Figure 3: Frequency of anthelmintics used in three major Veterinary facilities in Maiduguri within the period under review

Antelminthics utilization from 2018-2022 in three major Veterinary facilities in Maiduguri Metropolis

SA.H facility recorded 6633, UMVTH had 142 and FROVET had a frequency of 102 cases (Figure 5)

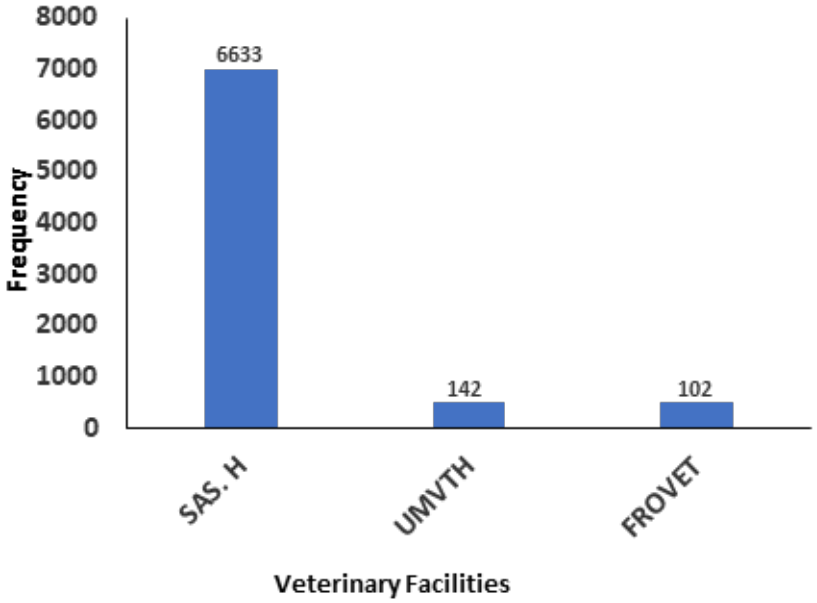

Figure 5: A comparison of anthelmintics utilization from 2018-2022 in three major Veterinary facilities in Maiduguri metropolis

Species, Sex and Age Distribution of Anthelmintics Use Across Three Major Veterinary Facilities in Maidugri Within 2018-2022

In Bovine, 438 (6.4%) anthelmintics were used, but in Ovine, 4643 (67.5%) anthelmintic drugs were administered, while in Caprine, 1796 (26.1%) dewormers were used. The results showed that Ovine species experienced the highest frequency of anthelmintic use within the study period.

Table 1: Showing the distribution of anthelmintics used across the three veterinary facilities among animal species, sex and age groups within the period under review (2018-2022)

Characteristics	Frequency	Percentage (%)
Species		
Bovine	438	6.4
Ovine	4643	67.5
Caprine	1796	26.1
Total	**6877**	**100**
Sex		
Male	4564	66.4
Female	2313	33.6
Total	**6877**	**100**
Age		
Adult	5699	82.9
Young	1178	17.1
Total	**6877**	**100**

Distribution of anthelmintics used across the three veterinary facilities based on type of diagnosis, form of drugs and route of administration

Greater percentage of clinicians treat cases based on tentative diagnosis, and majority used suspension and injectable forms of drug across the three clinics, but prepare mainly oral and subcutenous route for administration

Table 2: Distribution of anthelmintics used across the three veterinary facilities based on type of diagnosis, form of drugs and route of administration

Characteristics	**Frequency**	**Percentage (%)**
Type of diagnosis		
Tentative	6866	99.8
Definitive	11	0.2
Total	**6877**	**100**
Forms of Drugs		
Suspension	3235	47.0
Tablet	49	0.7
Injectable	3479	50.6
Bolus	114	1.7
Total	**6877**	**100**
Route of administration		
Orally	3495	50.8
Subcutaneous	3382	49.2
Intra muscular	0	0.0
Total	**6877**	**100**

Monthly Distribution of Routine Anthelmintics used in Maidugri Metropolis

More anthelminthics drugs were used between the months of June, July, August to September across the three clinics, this could propably associated with the increase burden of parasites infestation during the period.

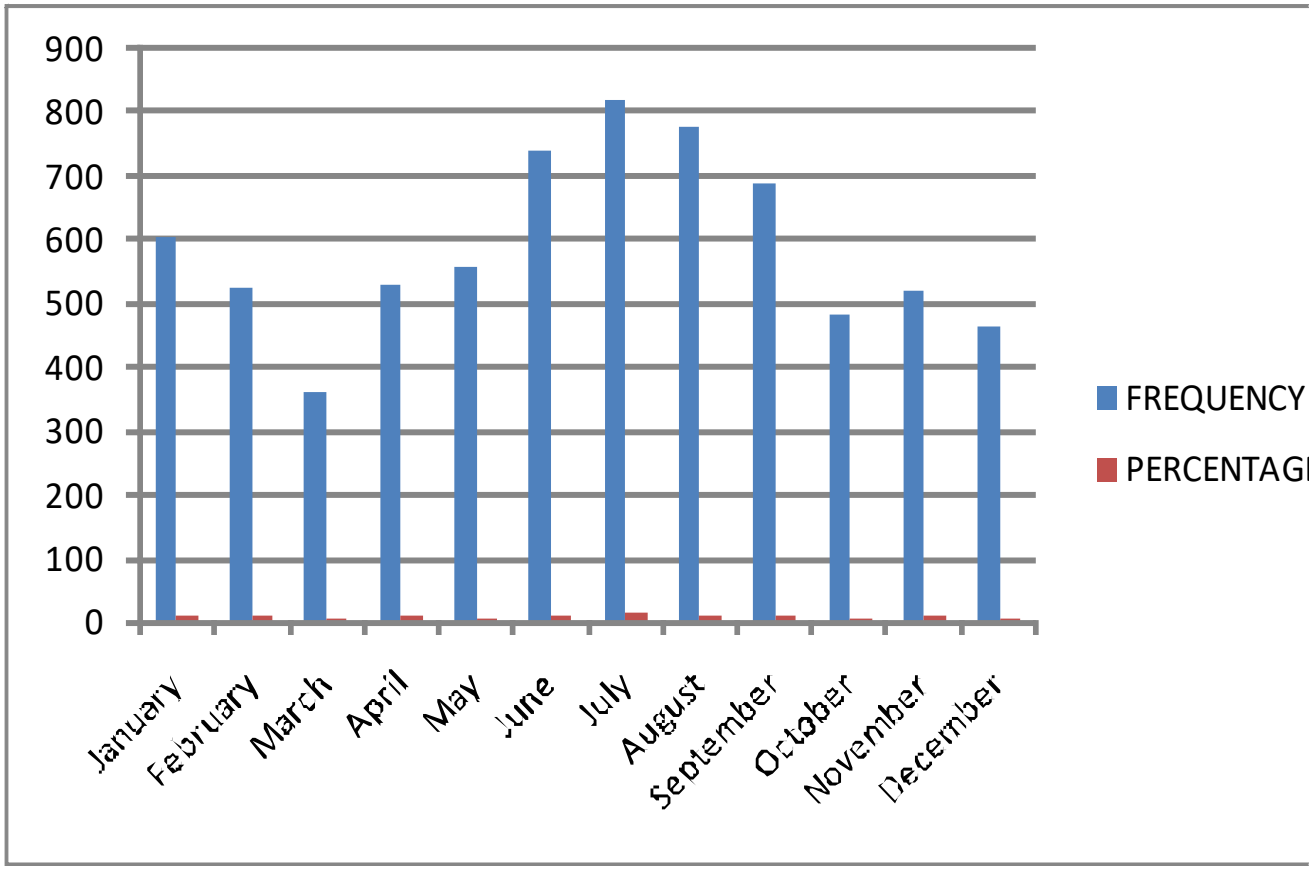

Figure 6. Monthly Distribution of the commonly used Anthelmintics in the three Veterinary facilities (UMVTH, SASH AND FROVET) between January 01, 2018 to December 31, 2022

Discussion

The study revealed anthelmintic drugs that were commonly prescribed and improperly used in the three veterinary facilities (UMVTH, FROVET and SAS Vet. Hospital) across Maiduguri metropolis. Three group of anthelmintics namely benzimidazoles (Albendazole, Fenbendazole, Mebendazole and Triclabendazole), Imidazothiazoles (Tetramisole and Levamisole) and macrocyclic lactone (Ivermectin) [12]were prescribed withinthe period under review. SAS Vet hospital had the highest frequency of anthelmintics used with 6322 (96.4%) from the total data collected, followed by the UMVTH with142 (2.1%)andFrovet with the list frequency of 102 (1.5%) prescriptions within the period under review. Similarly, Benzimidazole group constituted 47.9% of antihelmintics used in all the three, with Ivermevtin having 45.6% while, levamisole having only 6.6% utilization, these findings correspond with that of [13] who attributed the frequent use of benzimidazole and ivermectins to their broad-specturum of activities and wide margin of safety. However, frequent utilization of limited group of drugs for a long period may favour the development of resistance to some of these anthelmintic agents [14-16] and [17, 18].

The study also revealed that anthelmintic drugs were often prescribed in virtually all ruminant cases reported at these three facilities within the period under review which agrees with the findings from similar work reported by [19], in which 35% of the recorded cases indicated rational prescription of anthelmintics based on clinical findings relating to helminth infestation in the animals presented.While, 65.0% anthelmintics prescribed were just prescribed to treat diseases that were tentatively diagnosed as non-parasitic cases where the anthelminthes served only as prophylaxis as shown in (Table 2). This could be owing to the lack of proper diagnostic aids for confirmatory testing or the clinician's unethical actions and failure to follow an established

logical drug therapy. Furthermore, inadequate or improper administration of medications such as anthelmintics can have a negative impact on both the Dam and the fetuses, which may results in premature births, fetal abortion, and fetal abnormalities [20].

The study also revealed that the use of an anthelmintics varies with seasons, found to be more frequent in the rainy seasons than dry seasons as shown in Table 3. This could be attributed to the fact that the high moisture content during rainy seasons leads to increased development of larvae on abundant pasture, resulting in increased contact between the host and the parasites [21, 22] (Table 3). The study also revealed lower rate of anthelmintics used in younger animals (17.1%) than in adults (82.9%) which could be due to the tradition of keeping younger animals at home under intensive or semi-intensive management rather than letting them to go for grazing with the Dam, this minimized their exposure to the parasites along with the older animals consequently minimizing their exposure to the parasites [16, 17] .The study further indicate that sheep constitute 67.5% of the total cases reported for the period under review (2018-2022) with cattle and goats having 6.4% and 26.1% respectively. This could be ascribed to the management systems, and variation between species of these animals, as sheeps are largely managed under intensive or semi-intensive management system as compared to cattle and goats [23].

The study also revealed that most of the anthelmintics used were based on tentative diagnosis (99.8%) this could be due to lack of adequate diagnostic facilities and/or insufficient resources for the client to afford laboratory test consequently only (0.2%) were prescribed based on confirmatory diagnosis. Inview of these findings, we recommend that sound veterinary diagnosis should be established before administering anthelmintic agents for therapeutic purposes and the rotational use between classes of antihelmintic drugs should be practiced to minimize cases of antihelmintic resistance particularly among food animals.

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Conflict of interest

There is no conflict of interest as far as this research work is concerned. The Manuscript is an original work conceived and executed by the research team.

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