



## **Perceptions, Husbandry and Disease Management Practices amongst Cattle Owners of Mwandia District, Zambia**

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### **Authors' contributions**

Authors NS, JS and KSN designed the study, drafted the questionnaire and drafted and proof read the manuscript. Authors EM and WM participated in the design of the questionnaire and in drafting the manuscript. Author MM administered the questionnaire. All authors read and approved the final manuscript.

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### **ABSTRACT**

A cross-sectional questionnaire survey was conducted in Mwandia district of Western province of Zambia. The objective was to obtain preliminary data on cattle owner perceptions and awareness of livestock husbandry practices and disease management due to lack of information on livestock activities in the area. The study showed that cattle were the main livestock kept (60%), mainly of

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the indigenous local Barotse breed. The study further showed that public veterinary officials were the main source of advice on animal health (97%, 29/30 respondents vs. 3%, 1/30 for family members), and choice of drugs (100%) for the treatment of sick animals. All the cattle owners (30/30) reported having seen ticks on the cattle. Foot and mouth disease (27/30), contagious bovine pleuropneumonia (26/30) and anaplasmosis (22/30) were reported to be the most important cattle diseases. Surprisingly, none of the cattle owners responded to questions on theileriosis (corridor disease); nor did they report presence of trypanosomosis despite all of them (30/30) using antitrypanocides. The study further showed that oxytetracycline (30/30), Diminazene aceturate (Berenil<sup>®</sup>) (29/30), penicillin (29/30), and albendazole (28/30) were the most commonly used drugs. In addition to these drugs, local plants/herbs were also used. Inadequate water, stock theft and inaccessible veterinary services were among the challenges. Although farmers were familiar with many factors affecting their cattle, there was apparent lack of agreement between what the farmers knew and their management practices.

**Keywords:** Perceptions; livestock diseases; Mwanzi district; Zambia.

## 1. INTRODUCTION

Livestock plays an essential role in the economy of developing countries in Africa [1,2]. The livestock sub-sector accounts for 6% of the Zambian economy [3]. In addition, majority of the rural population depends at least in part on livestock as a source of protein in form of milk and meat, income and for other crop-related activities [4,5]. The majority of the cattle are kept under the traditional system as mixed crop-animal systems with subsistence utilization of outputs [6].

In Zambia, livestock diseases account for serious losses through cattle morbidity and mortality. The diseases reported in Mwanzi include contagious bovine pleuropneumonia (CBPP) [7], foot and mouth disease (FMD) [8], lumpy skin disease (LSD) and some soil-borne diseases such as anthrax [9] as well as clostridia myositis (Black quarter, BQ) [10]. In addition, Trypanosomosis has also been reported in the area [11]. These developments show that veterinary diseases are of paramount importance in Zambia, particularly in Mwanzi district.

Mwanzi district lies on the border with Southern province where there have been outbreaks of theileriosis (Corridor disease) due to *Theileria parva lawrencei* transmitted by the hard tick *Rhipicephalus appendiculatus* [12-14]. Wild animals such as the Buffalo (*Syncerus caffer*) have been identified as important natural reservoirs and a source infection for naive cattle [15]. In view of the increasing disease burden and probably their associated vectors in the region [16], coupled with the limited veterinary extension service delivery to livestock farmers, there was need to assess community knowledge

and perceptions on theileriosis since the disease has received a lot of medical veterinary attention of recent [17]. As information on husbandry practices and disease management in Mwanzi district was lacking, this study sought to obtain baseline data that would facilitate further in-depth investigations.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

Mwanzi district lies between Sesheke and Kazungula districts in the South-Eastern part of the Western province of Zambia (Fig. 1A). The district has a human population of 23,201 [18], with an estimated 35,000 cattle population. The land is generally not suitable for maize, the staple crop, because of the Kalahari sands, Mopane woodlands with a hot, semi-arid climate. The local community relies significantly on livestock as a source of income and draught power. The vast area of wetland along the Zambezi river flood plains and river banks is important for cattle grazing. Rainfall is generally low and variable, usually inconsistent, with occasional drought spells that affect grazing pastures. As such, cattle owners practice transhumance with their livestock between the higher lands and the low lying flood plains without feed supplementation. During the rainy season (November to April) they move with their animals to the upper lands and return to the low lands during the dry season (May to October).

### 2.2 Study Design and Data Collection

This cross-sectional study, using a questionnaire, was conducted between July and November

2013. The cattle owners were conveniently included in the study using the available local veterinary office data and snowballing technique due to mobility of cattle owners during the dry period of the year. The survey targeted cattle owners located on the eastern boundary with Southern province bound by the Kasaya river (Fig. 1B). A total of thirty (30) cattle owners were identified and interviewed at their residences/villages. A village/herd comprised cattle belonging to one or more individuals. The interviews were conducted by the local veterinary official who was able to administer the questionnaire in the local language.

The questionnaire was divided into seven sections including: location and interview details; household information; livestock inventory; cattle management; animal health and disease management; ticks and tick-borne disease management, and theileriosis. The range of questions included; the species and number of animals owned, the reasons for keeping cattle, cattle breeds, duration of keeping cattle. Husbandry data collected included information such as who took care of healthy and sick animals, challenges, disease management and preventive practices, extension services, veterinary drug sources, and treatment options. In addition, the final section dealt with knowledge and any experiences with theileriosis.

### 2.3 Data Analysis

Data was entered into a Microsoft Excel® Spreadsheet for some descriptive analyses. Graphing was performed in R statistical software package (R Core Team, 2014, Vienna Austria). Data are presented as absolute figures or proportions.

## 3. RESULTS AND DISCUSSION

### 3.1 Livestock Inventory and Uses

The cattle owners that were included in the study represented 7% (2,338/35,000) of the total cattle population in Mwandia district. As shown in Fig. 2, cattle constituted the highest proportion (60%, 2,338/3,893) of the livestock units followed by chickens, goats, pigs and donkeys. None of the farmers owned sheep. The average cattle herd size per village was 77.9 heads (range 13-250).

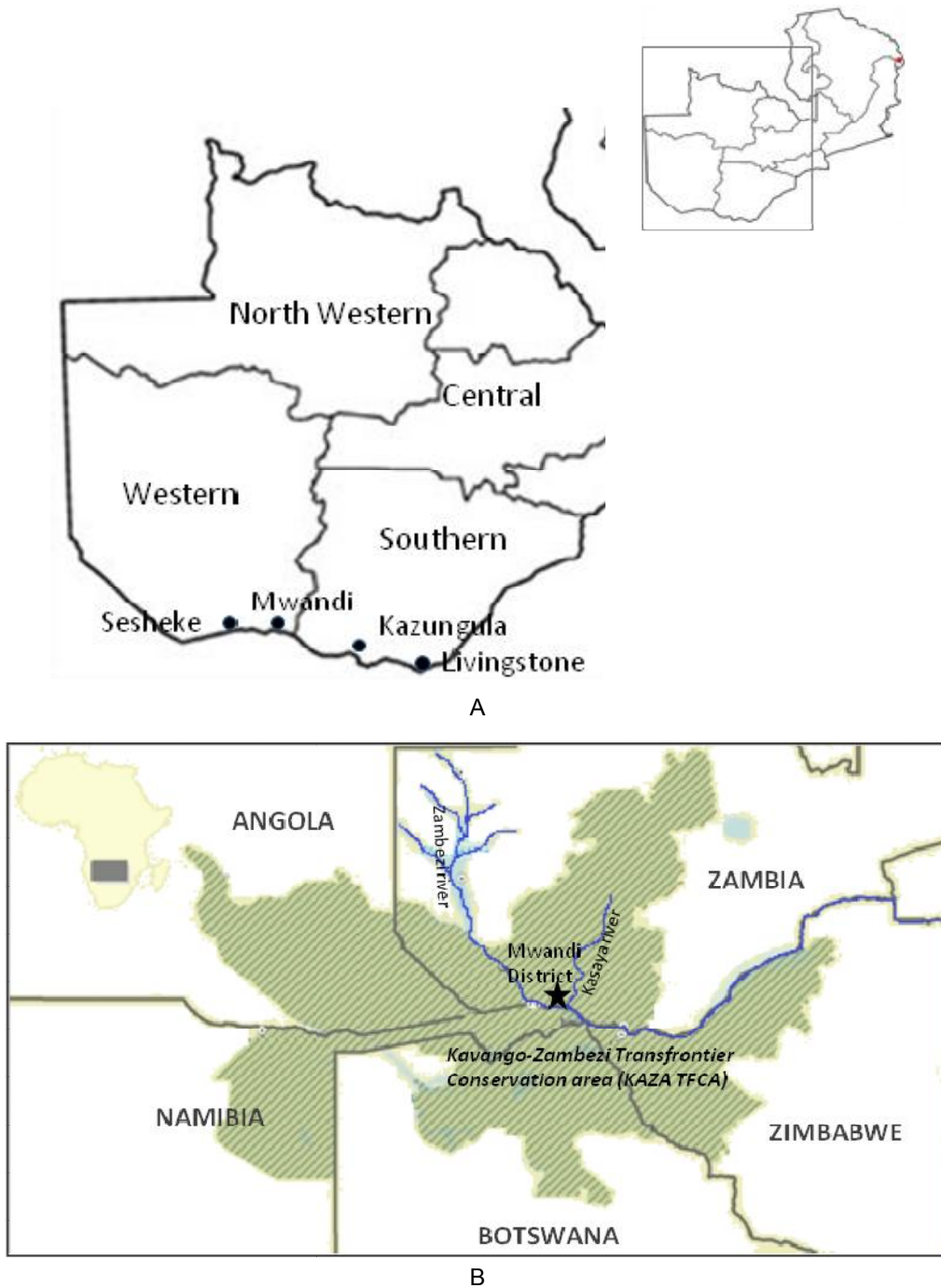
The majority (63.3%, 19/30) of the farmers had been keeping cattle for over 50 years, thirty

percent (9/30) for at least 10 years and the remaining seven percent (2/30) for less than 10 years. Such relatively long periods probably since settling in the area in the mid seventeenth century after the great migration from the south [19] would suggest that cattle rearing are an important part of the Lozi people of Mwandia district. Rivers and lakes were the main sources of drinking water for the cattle (Data not shown). Fifty percent of the respondents only had the local Barotse breed of cattle while some respondents had introduced some exotic breeds.

Unlike in other parts of the country such as Southern province where sheep are present [20], no one owned any sheep. There was an indication however, of an increase in the number of small ruminants (goats), pigs and donkeys in the district. Two villages (7%) had donkeys for draught power probably due to their resilience to infectious diseases compared with cattle. All the respondents had similar reasons for keeping cattle such as milk source, income and draught power for household chores and tilling the land for mixed crop and livestock production activities. Two respondents (7%) mentioned traditional ceremonies and lobola (dowry payment for marriage).

### 3.2 Cattle Management Practices

All the respondents used communal grazing lands for the cattle all year round. Their animals spent nights in the kraals during the farming season, except when grazing on the flood plains (during the dry season) when cattle movement was less restricted. It was noted, from the responses, that most (87%, 26/30) of the herding activities were performed by the husband or the male head of the family with the help of the children. Only two villages (7%) reported hiring a herdsman (Table 1). This could indicate the lack of sufficient income to hire a herdsman. The husband was also the main person responsible for taking care of sick animals. Treatment, i.e. choice and actual administration of drugs or herbs to the sick animals was mainly performed by either a family member or public veterinary official (Table 1). From these findings, it can be speculated that having such a large proportion of family members making decisions on disease and treatment options could potentially compromise the efficacy of treatments and contribute to the development of drug resistance as dosages may not be adhered to.



**Fig. 1. A) Map of Zambia showing the location of Mwandishi district and adjacent Sesheke district in Western province; Kazungula and Livingstone districts (Southern Province), Northwestern and Central provinces. Full map of Zambia (top right insert). B) Map showing the location of Mwandishi district, Zambezi and Kasaya river (boundary of Western and Southern province) lying within the Kavango Zambezi Transfrontier conservation Area (KAZA TFCA) stretching across Angola, Zambia, Zimbabwe Botswana and Namibia. Adapted from [www.peaceparks.org](http://www.peaceparks.org)**

**Table 1. Individuals responsible for milking and herding, caring and treating sick animals (n=30)**

<b>A. Herding/milking</b>	<b>Number</b>	<b>Percentage</b>
Husband/Children	26	87
Husband/Children/Herdsman	2	7
Children/Herdsman	1	3
Herdsman	1	3
<b>B. Care for sick animals</b>		
Husband	15	50
Husband/Children	15	50
<b>C. Drug administration/treatment</b>		
Family Member/Vet. Official	23	77
Veterinary official	7	23

### 3.3 Tick Control

All the farmers had seen ticks on their livestock at some point in time and the control measures used were spraying (87%, 26/30), tick grease (33%, 10/30), ivermectin (23%, 7/30), scissors (10%, 3/30), kerosine (7%, 2/30) and engine oil (7%, 2/30) (Table 2). Most of the respondents took action only when they saw the ticks on the animals (77%, 23/30) (Table 3). Others controlled ticks at intervals of; twice a week, three times a month, during the rainy season only, three times during the rainy season, once a year, twice a year, and three times a year (Table 3). It was evident that there were various approaches to controlling ticks; however, it was doubtful whether the measures were effective since the activities were not carried out regularly. The lack of consistency in the carrying out tick control activities was similar to reports from other studies on rural communities in the region [21].

### 3.4 Livestock Diseases

The cattle diseases were given as proportion of the respondents who perceived the diseases as important. Nearly all the farmers thought that FMD (90%, 27/30) was important followed by CBPP (87%, 26/30) and anaplasmosis (73%, 22/30) as shown in Fig. 3. Conditions such as "soil-licking" (pica) were considered a disease and not a trace mineral deficiency. Tick-borne diseases that farmers were aware of included anaplasmosis, babesiosis, and heart water. No farmer reported having knowledge about corridor disease or had previously experienced the disease in their herds, despite the reported outbreaks in the neighbouring Southern province (Fig. 1A). This would probably have been due to farmers' limited knowledge on the clinical presentation of the disease thereby confusing it with other conditions.

It was interesting to note that although the majority of the farmers indicated that they practiced some form of external parasite control on their cattle, the efficacy of these measures in preventing disease transmission was doubtful. This was because the frequency of activities was based on seeing ticks on the animals [22]. We are not aware of any government veterinary department-driven formal policy on dipping of animals in Mwandia district although the farmers reported that they were encouraged to do so. Although the use of engine oil to control ticks has been found to have some acceptable effects [23], it may not be effective, just like the use of scissors to cut off attached ticks from an animal. The use of these practices to control ticks could be attributed to the non-availability of professional advice on external parasite and tick control or owners may not be willing to spend considerable amounts of money on modern conventional acaricides.

### 3.5 Livestock Diseases and Wildlife

More than half (53%, 16/30) of cattle owners reported their cattle to have had contact with wild animals. Recently, wildlife were introduced in the Simalaha community conservancy by the Peace parks foundation through the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) linking protected areas and cultures of Angola, Namibia, Botswana, Zambia and Zimbabwe (Fig. 1B). The study coincided with this re-introduction of the wildlife, which could explain the reported livestock contact with wildlife by the farmers. After this introduction of wildlife in the area, follow-up studies on disease patterns would be necessary as increased contact with wild animals has been reported to predispose domestic livestock to infections [20,24,25].

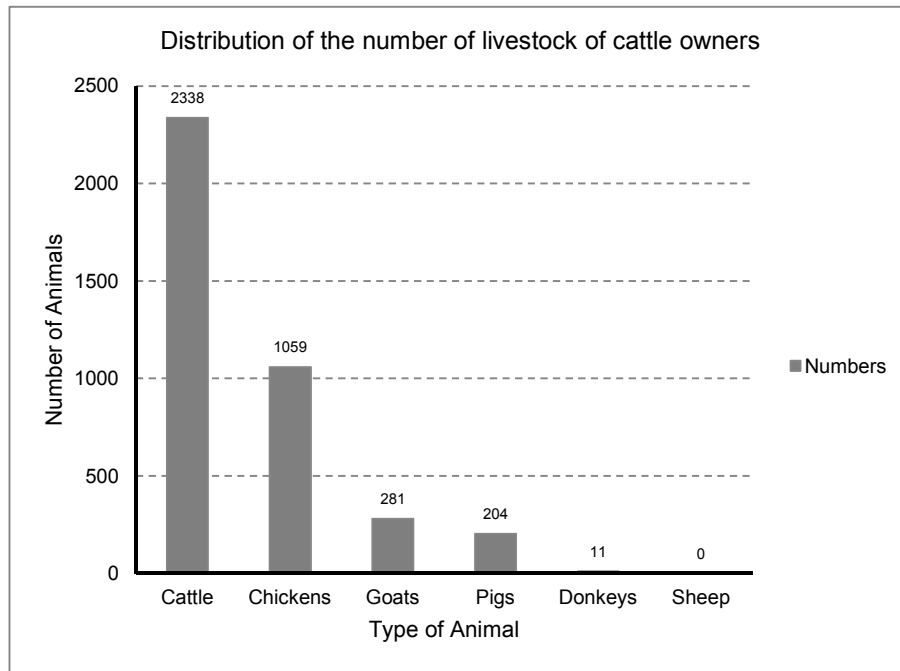


Fig. 2. Number of various animals kept by livestock owners (n=30) in Mwandia district

Table 2. Various methods of tick control and the proportion (%) of cattle owners using them

Dipping	Spraying	Tick grease	Ivermectin	Scissors	Kerosine	Engine oil
0/30 (0%)	26/30 (87%)	10/30(33%)	7/30 (23%)	10/30 (3%)	2/30 (3%)	2/30 (3%)

Table 3. Frequency of tick control in cattle and the proportion of respondents for each

When ticks are seen	Twice a week	Twice a year	3 times a year	3 times in rain season	3 times a month	Once a year	Rainy season
23/30 (100%)	1/30(3.3%)	1/30(3.3%)	1/30(3.3%)	1/30(3.3%)	1/30(3.3%)	1/30(3.3%)	1/30(3.3%)

Table 4. Drugs used for treatment of animal conditions and the proportion of cattle owner using them

Oxytetracycline	Penicillin	Diminazene aceturate (Berenil®)	Albendazole	Ivermectin	Isometamidium chloride (Samorin®)	Other Dewormers
30/30 (100%)	29/30 (97%)	29/30 (97%)	28/30(93%)	13/30(43%)	3/30 (10%)	1/30(3%)

### 3.6 Antibiotics and Other Medicines

As shown in Table 4, nearly all the cattle owners reported the use of oxytetracycline (100%, 30/30), Diminazene aceturate (Berenil®) (97%, 29/30), and penicillin (97%, 29/30), albendazole (93%, 28/30), ivermectin (43%, 13/30) isometamidium chloride (Samorin®) (10%, 3/30) and other dewormers (3%, 1/30). There were three main sources of these drugs; local veterinarian official, chemists and retail shops.

The most common source of the drugs was the local veterinary official and shops (87%, 26/30), the chemists accounted for the remaining 13% (4/30). From these findings, it was evident that the farmers used a limited variety of drugs for treatment of sick animals. Some drugs could have been used inappropriately. For instance, despite the use of antitrypanocides, there was no mention by the livestock owners of the presence of trypanosomiasis among the important diseases. However, the study did not establish which drug

was used to treat which specific diseases. A number of plants/herbs were also used for treatment various conditions (Table 5). This finding was not surprising considering the majority of cattle owners had been keeping cattle for a relatively long time.

### 3.7 Challenges and Level of Importance

The respondents were asked to rank the challenges (cattle diseases, inadequate water sources, poor grazing pastures, infertility, stock theft and inaccessibility to veterinary services) in their order of importance on a scale of 1-3 (rank

3 as more important and 1 as least) (Table 6). Availability of water and stock theft were among the most frequent responses regarding the challenges the respondents faced (Table 6). This suggests that to the local people availability of water and stock thefts should not be overlooked when designing mitigation measures that would assist farmers in the management of the challenges. The frequent mention of these challenges by the farmers could be an indication that they significantly affected their livelihoods. These challenges faced in this area were common to the region [26].

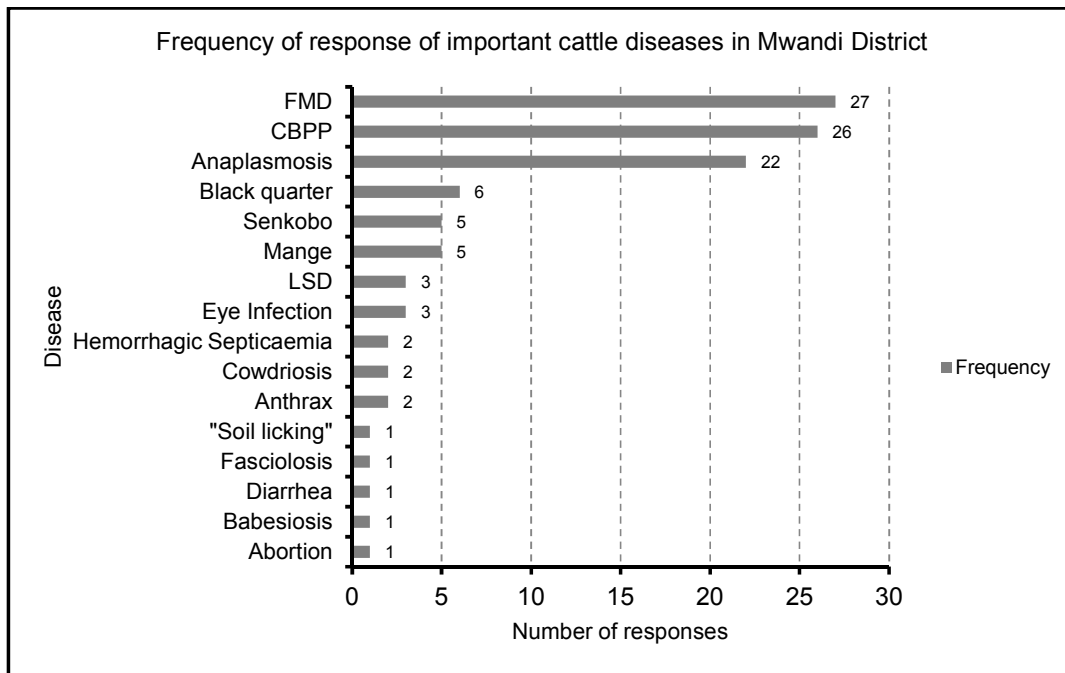
**Table 5. List of specific diseases of cattle in Mwandia district and some local plant herbs or substances named for treatment**

Disease		Local plant herbs/substances		
Name	Local name	Local name	Name	Proportion of users
Anaplasmosis	Nyooko	Sikubabe	<i>Dioscorea quartiniana</i>	3/30
		Katima	<i>Cassia occidentalis</i>	5/30
		Sitati	<i>Aloe vera</i>	5/30
		Mupumangoma	<i>Albizia versicolor</i>	1/30
		Kapusi-pusi	NA	1/30
Anthrax	Lubete	Permanganate	Potassium permanganate	1/30
Diarrhea	Musululo	Mupani	<i>Colophospermum mopane</i>	4/30
		Mukulwani	<i>Borassus aethiopum</i>	1/30
Diarrhea (bloody)	Mali mwa	Muhonono	<i>Terminalia sericea</i>	4/30
Mange	Musululo			
Senkobo	Sikwekwe	Sikubabe	<i>Dioscorea quartiniana</i>	1/30
		Lungwatanga	<i>Acanthosicyos naudinianus</i>	1/30
		Musikili	<i>Trichilia emetica</i>	1/30
		Simalembo	<i>Gnidia daphnifolia</i>	1/30
		Sifulukunde	NA	1/30
		Malumani	NA	1/30
		Kupa	Shell (ashes)	1/30
Eye infection	Meeto			
FMD	Taku ni Mulomo	NA	NA	NA
Hemorrhagic Septicemia	Kang'oto	NA	NA	NA
Liver flukes	Minyopi	NA	NA	NA
"Soil licking"/pica	Ku kuma mubu	NA	NA	NA
Swollen joints	Mutumbu	NA	NA	NA
Babesiosis	Mali mwa maswafu	NA	NA	NA

\*NA- Not available

**Table 6. Challenges mentioned by the farmers and the frequency for each of the scores 1-3 (3 as more important and 1 as least)**

Score	Cattle diseases	Inadequate water sources	Inadequate pastures	Fertility problems	Stock theft	Veterinary services
1	5	0	1	11	1	6
2	0	1	18	11	2	7
3	25	29	11	8	27	17
<b>N</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>



**Fig. 3. The proportion of responses of important cattle diseases in Mwand district (n=30). (FMD - Foot and mouth disease; CBPP - Contagious bovine pleuropneumonia; LSD - Lumpy skin disease)**

#### 4. CONCLUSION AND RECOMMENDATIONS

This survey has highlighted some key aspects on husbandry practices, farmer awareness of livestock disease management and prevention, antimicrobial use, as well as challenges that farmers faced. It was evident that a significant proportion of the activities of the livestock owners had shortcomings. Overall, cattle owners were aware of the various livestock husbandry practices and cattle diseases. However there were obvious disparities between what the cattle owners knew and the interventional activities they practiced. These preliminary findings showed the need for further in-depth investigation to address and establish the impact of the specific findings from this study.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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