Addis Ababa University

School of Pharmacy

Department of Pharmaceutics and Social Pharmacy

Assessment of Animal Owners' Perspective and Facility Practice on Antimicrobial Medicines Use in Food Animals in Gondar City and its Surrounding

By:

Atsede Getaneh (B. Vet-Pharm)

March 2023

Addis Ababa, Ethiopia

Addis Ababa University

School of Pharmacy

Department Pharmaceutics and Social Pharmacy

Assessment of Animal Owners' Perspective and Facility Practice on Antimicrobial Medicines Use in Food Animals in Gondar City and its Surrounding

By: Atsede Getaneh

Advisor: Dr. Eskinder Eshetu (PhD)

A master's thesis submitted to the School of Graduate Studies at Addis Ababa University to meet in part the criteria for the degree of "Master of Science in Pharmaco-epidemiology and Social Pharmacy" in the Department of Pharmaceutics and Social Pharmacy

March 2023

Addis Ababa, Ethiopia

Addis Ababa University

School of Graduate Studies

This is to certify that the thesis prepared by Atsede Getaneh entitled: *Assessment of Animal Owners' Perspective and Facility Practice on Antimicrobial Medicines Use in Food Animals in Gondar City and its Surrounding* and submitted in partial fulfillment of the requirements for the Degree of Master of Science (Pharmacoepidemiology and Social Pharmacy) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the Examining committee

Examiner (External): Dr. Workineh Shibeshi Sig _____ Date _____

Examiner (Internal): Zelalem Tilahun Sig _____ Date _____

Advisor: Dr. Eskinder Eshetu Ali Sig _____ Date_____

_____

Chair of Department

Abstract

Assessment of Animal Owners' Perspective and Facility Practice on Antimicrobial Medicines Use in Food Animals in Gondar City and Its Surrounding

Atsede Getaneh

Addis Ababa University, 2023

Background: Due to the increment of utilization of antimicrobial drugs in food animals there is an increased irrational use. However, there is a paucity of data on the perspective of animal owners and antimicrobial medicine use in food animals in Ethiopia.

Objectives: To assess animal owners' perspectives and facility practice on antimicrobial medicine use in food animals in Gondar city and surrounding.

Methods: A cross-sectional study design was conducted from September to December 2021. The study used both quantitative and qualitative methods. To collect qualitative data from animal owners used depth interview and computed manually. The quantitative data were coded, entered, and analyzed in SPSS version 20. P-value < 0.05 was considered significant.

Results: In the national list of essential veterinary drugs**,** all drugs were prescribed under their generic name**.** Approximately 68.7% were antibiotics and 97.8% were injections. The average amount of drug per prescription was 1.5. Out of 15 essential medications, three were found in every clinic and two weren't available everywhere. Five facilities had both national veterinary drug list and guideline for veterinary treatment, while seven facilities lacked both. Of all interviewees 285 (47.5%), 289 (48.2%), and 26 (4.3%), respectively had low, moderate, and good competency in the use of medicines.

Conclusion and recommendations: In general, various facility indicators and prescribing practices haven't met the standard. Moreover, only a few of the individuals had used medicines successfully in the past. Thus, the facilities should fulfill essential guidelines, provide vital medications, and increase farmers' awareness.

Keywords: *animal owner, antimicrobial, food animal, irrational use, qualitative, and quantitative.*

Acknowledgment

First, I went to thank the great God for his limitless gifts in my life. Second, I am pleased to thank my advisor, Dr. Eskinder Eshetu for his wise advice and for taking the time to give me the information I needed to write this thesis.

Third, I want to express my gratitude to UoG for sponsoring me and to AAU for funding my study. I would also like to thank Mr. Wondiem, Dr. Melkamu, and Dr. Mohammed for their guidance and all veterinarians working at the study site, for their support in data collection. Finally, but certainly not least, I want to thank my family.

Table of content

Contents

List of Figure

List of Table

List of Abbreviations and Acronyms

AMs	Antimicrobials
CDC	Central for Disease Control and privation
CSA	Central Statics Agency
DACA	Drug Administration and Control Authority
EDL	Essential Drug List
FAO	Food and Agricultural Organization
FDA	Food and Agriculture Organization
FMHACA	Food, Medicine and Health care Administration and Control Authority
KAP	Knowledge, Attitude, and Practice
OIE	The Office International des Epizooties of the World Organization for animal health
SPSS	Statistical Package for Social Science
SVTG	Standard Veterinary Treatment Guideline
USDA	United State Department of Agriculture
VDFACA	Veterinary Drug and Food Administration and Control Authority
WMA	World Metrology Agency
WHO	World Health Organization

1. Introduction

Food animals are widely distributed in the world and source of 40% of the global agricultural value (FAO, 2013). They are also a source of food, heat, income, socio-cultural wealth, and clothing for billions worldwide (Pollott and Wilson, 2009). In the world, 1.5 billion Cattle, 1.2 billion sheep, 1 billion goats, and 14 billion chickens were found (FAOSTAT, 2016). All of those are used antimicrobial drugs as prophylaxis, therapeutic, or growth promoter. Therefore, antimicrobial drugs use in an animal is a potential issue of public health relevance (Barlow, 2011). This issue becomes more critical in the absence of used rationally (VDFACA, 2016). Reasons of drugs use incorrectly are a lack of information, lack of diagnostic tools, and poor training of professionals (Shivhare *et al.*, 2010). Another reason is that a large number of animals tend to reside in remote areas, and in these areas, the number of veterinary professionals is likely to be limited (Mccorkle and Mathias, 1992).

Ethiopia is one of the largest livestock populations in Africa (Solomon et al., 2003). So understanding perspectives of animal owners concerning antimicrobial drug use in food animals is significant to making appropriate interventions and strategies to promote the rational use of medicines in animals. But there is a lack of information on the perspective of animal owners in the Ethiopian context. Therefore, this study focused on studying animal owners' perspectives and practices concerning the use of antimicrobials in food animals. It also evaluated facility-specific practice to depict a full picture of the level of rational use of antimicrobial agents in the context of a mix of urban and rural settings in North-western Ethiopia.

1.1. Statement of the problem

Consumption of antimicrobials by food animals has grown in recent years (Hillerton *et al.*, 2017). As a result, irrational use appears to have increased, potentially leading to ineffective and unsafe treatment and unnecessarily wasted resources (DACA, 2006). Livestock productivity can also decrease when animal health suffers (Grace *et al.*, 2012). In addition to their impact, any animal health impact can affect human health through food-borne diseases like brucellosis; the risk of transmitting zoonotic pathogens like anthrax (Mableson *et al.*, 2014). It could also be a cause of other suspected problems like allergic reactions, liver damage, yellowing of teeth, and gastrointestinal upset (WHO, 2002). This is because some quantities of drugs remain in animal products (meat, milk, and eggs) (Sanders, 2007).

In Ethiopia 65.4 million cattle, 39.9 million sheep, 50.5 million goats, and 49 million chickens were found (CSA, 2020). Therefore, agriculture is the most essential sector in the economy because it contributes 41.4% of the national GDP (Matous *et al.*, 2013). Plus in livestock sector contributes 15% incomes from export and 30% job of agriculture (Behnke, 2010). It also contributes 16.5% of the total and 35.6% GDP of agriculture (Metaferia *et al.*, 2011). So, proper use of an antimicrobial drug in food animals is very important. Studies on human patients and facilities treating them seem to suggest that there is widespread misuse of antimicrobials leading to antimicrobial resistance (Getachew *et al.*, 2013). However, there is not one report on the rational use of antimicrobial drugs in food animals in the northern part of Ethiopia and Ethiopia generally.

Already available studies in the area focus on the assessment of prescriptions (Beyene *et al.*, 2015, Beyene *et al.*, 2016) and lack the perspectives of animal owners and animal health facilities. However, animal owners make the decision on antimicrobial drugs used for animal, based on their knowledge and attitude (Willock *et al.*, 1999). For that reason, assessment of the animal owner's perspective is important to reduce inappropriate use and improve antimicrobial effectiveness. As such, this study assessed animal owner perspective and facility practices on antimicrobial medicines use in food animals in the context of selected government veterinary clinics in Gondar city and its surrounding.

1.2. Significance of the study

Proper antimicrobial use is one of the important components of animal health. The rational use of drugs in veterinary medicine has both public health (FAO/OIE/WHO, 2004) and economic significance (WHO, 2001). Therefore, information on the level of rational use of antimicrobial drugs in food animal plays a critical role in containing the threat of antimicrobial resistance. The finding of this study will shed light on the level of rational antimicrobial use in the study area and identify the factor that influences animal owner practice on antimicrobial drug uses in food animals.

2. Literature Review

2.1. Antimicrobial use in animals

A drug is “any ingredient that is inhaled, injected, consumed, ingested through a skin patch, or dissolved under the tongue and used to promote health by treating, curing, preventing, or diagnosing disease” (Flynn, 2012). Veterinary drugs are used to improve any physical, mental, or organic function in an animal that belongs to different chemical classes or therapeutic areas (Fingleton, 2004). So in the world, the most essential and commonly used veterinary drugs are antimicrobials (Fischer *et al.*, 2003).

The terms “antimicrobial” and “antibiotic” are mostly used interchangeably but are not synonymous. “Antibiotics” are substances created by one microorganism that kill or restrain the development of other microorganisms (Russell, 2004). It has been used to inhibit and treat microbial disease for over 50 years (Flynn, 2012, WHO, 2018). It is only active against bacteria, whereas “antimicrobial” is active against all microorganisms (Guardabassi and Courvalin, 2005). The classification of AMs based on exposure to microorganisms includes antifungals, antivirals, and antibiotics. Antifungal is used against fungi and antiviral activities against viruses (Brooks *et al.*, 2007).

Antimicrobials are used not only by humans but also by animals as treatments, to prevent disease, and as growth promoters (Barlow, 2011). Therapeutic use means to cure established disease, and prophylaxis is the usage of medicines individually or group to prevent the development of infection (WHO, 2012). And growth promoters are provided to a healthy animal at a sub-therapeutic dose (Graham *et al.*, 2007). Antibiotics have a broad or narrow spectrum, broad-spectrum antibiotics are inhibit growth or kill a variety

of bacteria, and narrow-spectrum antibiotics are more specific for treating bacteriological pathogens of certain species (Guardabassi and Courvalin, 2005). In addition, it can be bactericidal or bacteriostatic. Bactericidal are antibiotics that kill microbes, and bacteriostatic are, antibiotics that stop bacteria from growing (Walsh, 2003).

2.2. Food animals

Food animals include cattle, sheep, goats, and chickens. Cattle are commonly used animals in the livestock sector. Sheep and goats are a group of food animals called small ruminants because of their rumination (FAO, 2013). During rumination, digest from the rumen is re-chewed and re-swallowed in the rumen (Ruckebusch, 1988).

Globally, there are 1.5 billion cattle, 1.2 billion sheep, 1 billion goats, and 14 billion chickens (FAOSTAT, 2016). These animals contribute to landless, rural farming, and increasingly urban households by providing them with food, heat, income, sociocultural wealth, and clothing (Pollott and Wilson, 2009). Their skins were used to make leather, and their dung was used for fuel. Cattle also have religious meaning in some parts of India, (Jha, 2000). Consequently, they account for 40% of global agricultural value (FAO, 2013).

In food production, food animals are a source of milk, meat, and eggs. For example, cattle are used as a source of meat and milk (Moran, 2015). Poultry is both a source of eggs and meat (Storey *et al.*, 2012) and it is the second-most popular type of meat consumed worldwide (Raloff, 2003). In 2013, 65.5 million ton eggs were produced (USDA, 2014). According to the FAO, 296 million tons of meat were produced worldwide in 2010, of which, 33% come from poultry, and 5% from goats and sheep

(FAO, 2013). When bacterial disease occurs in livestock, it can result in economic and welfare losses in food production (Page and Gautier, 2012). Therefore, meat products can be made safer by treating sick animals with antimicrobial drugs (CDC, 2005).

2.3. Antimicrobial use in food animals

The most common disease in food animals, particularly in cows (milk production), goats, and sheep, is mastitis (Page and Gautier, 2012). Mastitis refers to an inflammatory response in the udder tissue (Mackintosh, 2015). These diseases are contagious and cause various problems when animals are kept in large groups and live close together (Wegener, 2003). To prevent these and other diseases, food animals can be given antimicrobial drugs. The use of antimicrobials for food animals was introduced in the late 1940s (Mitchell *et al.*, 1998). Of the total amount of AMs that was produced worldwide, half are used by food animals. Among them, most are used for disease prevention and weight gain (WHO, 2002). When administering AMs, dosage, duration, mode of administration, and withdrawal time can be considered (Anthony *et al.*, 2001).

Penicillin is utmost common antimicrobial agent in food animals (Briyne *et al.*, 2014). It was the first drug discovered by Alexander Fleming in 1928 (Zaffiri *et al.*, 2012). Streptomycin and Penstrep (a combination of penicillin and streptomycin) are also utmost common drugs (Beyene *et al.*, 2016). Streptomycin was discovered in 1943 from streptomycin griseous (Paulsen, 1996). It is included in the WHO essential medicine lists, which lists the most effective and safe medicines needed by the healthcare system (WHO, 2015). Cephalosporin and Sulphonamide are also the most commonly used (Moyane *et al.*, 2013). Cephalosporin is a broad-spectrum antibiotic that was discovered

in 1945 and firstly marketed in 1964. First-generation cephalosporin is predominantly active against gram-positive bacteria (Sweetman, 2005). Sulphonamide is a broad-spectrum bacteriostatic antibiotic, and resistance to this drug was discovered before the 1940s (Davies and Davies, 2010).

More than 20 tetracycline are currently available, the most common of which are tetracycline, chlortetracycline, oxytetracycline, and doxycycline (Fritz and Zuo, 2007). Tetracycline was discovered in 1940 and acts as a broad-spectrum antibiotic used to treat gram-positive and gram-negative bacteria and protozoan parasites (Chopra and Roberts, 2001). Oxytetracycline was innovate in 1949 and commercialized in 1950 (Fischer and Ganellin, 2010). It is on the WHO list of essential medicines (WHO, 2019).

2.4. Relation between antimicrobial use in food animals and public health

More than a billion people around the world work with food animals every day. These are farmers, workers at slaughterhouses, and market workers. One-third of the urban and two-thirds of the rural dwellers depend on livestock for food and income (Perry and Grace, 2009). Most people needed food that was easy to cook, possibly due to population growth and urbanization, so the market for the agriculture sector is increasing (Swanepoel *et al.*, 2010).

There is a positive or negative association between the use of AMs in food animals, human nutrition, and health outcomes. Globally, 13% of calories and 30% of protein come from food animal products (meat, milk, and eggs) (Steinfeld *et al.*, 2006). Positive effects include improved growth, health, and cognitive abilities of children (Iannotti and Lesorogol, 2014). Access to nutritious animal products (milk, meat, and eggs) is used to

increase resistance and recovery from infectious diseases (Bhaskaram, 2002) so should be increased access to nutritious animal-source food.

The negative effects are the transmission of zoonoses and food-borne diseases. A food-borne illness like brucellosis occurs when humans consume animal products (meat, milk, and eggs) that contain a minimum quantity of drugs (Sanders, 2007). A zoonotic disease is an infection or infectious disease that is transmitted from animals to humans, e.g. anthrax (Mableson *et al.*, 2014). Known food-borne zoonotic agents include Salmonella and E. coli (Humphrey, 2000). Food-producing animals are the main reservoir, and the main source of infections is meat products (Anderson *et al.*, 2003). Other undesirable effects also include allergic reactions, liver damage, yellowing of teeth, and gastrointestinal disorders (WHO, 2002). They also cause antimicrobial resistance. This can lead to therapy failure and higher mortality and morbidity, which can lead to economic losses and animal welfare problems in veterinary medicine (Acar, 1997).

Why is it important to study antimicrobial uses in food animals? Because improving rationality is unquestionable. And irrational uses of antimicrobials are one of the top ten causes of death and morbidity around the world (White *et al.*, 1999). Therefore, reducing the occurrence of animal disease can reduce the chances of food-borne and zoonotic diseases in humans. So the study of antimicrobial use in food animals is very important to reduce those problems, by creating awareness among animal owners about the effects of irrational use of antimicrobials on food animals.

2.5. Rational use of antimicrobials in food animal

The rationally uses of drugs means using the right drug at accurate dose, at the precise price, and at the accurate time (WHO, 2012). And the rational uses of drugs in animal husbandry depend on the availability of safe, effective, and affordable drugs of the required quality and quantity. Moreover, drugs should be prescribed, dispensed, and used properly (VDFACA, 2016).

Drugs not using in the right way and at the proper dose, prescribing more drugs per patient, using antibiotics for non-bacterial infections, and prescriptions that don't follow clinical guidelines is called irrational use (WHO, 2002). And also absence fair cost and a lack of consideration for drug effectiveness (Mao *et al.*, 2015).

2.6. Reason for irrational use of antimicrobial drugs

The previous study reported that, due to different reasons, antimicrobials was used irrationally (Nepal and Bhatta, 2018), in both developed and underdeveloped countries (Pechere *et al.*, 2007). The reasons are related to professional knowledge and performance, diagnostic activity, the communication of users and professionals, health sector monitoring policy, and user culture and economy (Franco *et al.*, 2009).

The first reason is related to professionals. The study shows that the current knowledge of medical graduates on the treatment of infections with antibiotics is low (Humphreys *et al.*, 2006). This is due to health professionals' lack of proper clinical training. Therefore, they don't choose appropriate antibiotics to treat disease (Ibia *et al.*, 2005), they can't explain some basic information about the use of the drug (WHO, 2013), and they may prescribe the drug unethically and irrationally (Devries *et al.*, 1994). Prescriptions are a

legal document holding the prescribing physician and the dispensing pharmacist responsible for all drugs that are prescribed and dispensed (Sharif *et al.*, 2008). It also provides a perception of the environment of the healthcare delivery system (Partha and Nagesh, 2002). In addition, due to the belief that "every ill has a pill", professionals prescribed drugs for each illness to fulfill the user's trust (Brahma *et al.*, 2012), which caused problem (Enwere *et al.*, 2007).

The second reason for irrational use is related to the user. Antimicrobials use in animal subjects is decided by animal owners based on their knowledge and attitude (Willock *et al.*, 1999). The decision-making is prepared and applied by a single person (Groenewald, 1987) or may be externally forced (Errington and Tranter, 1991). Hence, during self-medication, most of the time, drugs are used irrationally (Jafari *et al.*, 2015). In addition, non-completed treatment, missing the proper dose (Spellberg *et al.*, 2013), leftover medicines use again, and use of antibiotics for viral disease (Skliros *et al.*, 2010) may cause irrational use of antimicrobials (Nepal and Bhatta, 2018).

The other reason for irrational use is incorrect diagnosis. It is due to, the shortage of veterinary professionals in remote areas (Mccorkle and Mathias, 1992). And due to a shortage of diagnostic resources, the majority of animals receive a diagnosis without undergoing a laboratory test (Vance and Millington, 1986). The cost of laboratory testing can increase the cost of treatment, and the animal owner may not accept these additional costs so it promotes polypharmacy (Gnanou, 1998). Polypharmacy is a practice of prescribing multiple medicines to one individual (Duerden *et al.*, 2013). It could raise the

chance of negative drug reactions, inappropriate prescribing, and medication mistakes (Cooper *et al.*, 2016).

Moreover, due to information shortages, unreliable sources, and ineffective regulation of medicine (Burke *et al.*, 2006), the knowledge, views, and attitudes of users, professionals, and manufacturers are other reasons for drug use irrationally (WHO, 2012). Those may cause the spread of antimicrobial resistance because excessive and inappropriate use of antibiotics play a role in the development of resistance (Canton *et al.*, 2013). For that reason, assessing facility practices and the animal owner's perspective is very important to reduce inappropriate use and increase the effectiveness of antimicrobials (Belongia and Schwartz, 1998).

2.7. Problems associated with irrational use of antimicrobials

Globally, a large number of drugs are prescribed and dispensed incorrectly (WHO, 2007), which causes irrational drug use. It is a global problem (WHO, 2002) for both veterinary medicine including food animals, and human medicine (Catery *et al*., 2003). Because it is one of the top ten causes of mortality and morbidity around the world (White *et al.*, 1999). So it is more wasteful, expensive, and dangerous (WHO, 2012).

Irrational use causes drug resistance, wastage of resources (Panda *et al.*, 2016), ineffective treatment, increased costs by reduced the accessibility of other essential drugs and may harm patient animals (DACA, 2006). In addition, it could result in a decline in the standard of drug therapy and a rise in the likelihood of undesirable side effects such adverse drug responses (Vance and Millington, 1986). Also may cause infections and

death (Brahma *et al.*, 2012). So it is a global hazard to animal health (Levy and Marshall, 2004).

Now antimicrobial resistance is increasing (WHO, 1998) especially with antibiotics, it is major international problem (WHO, 2012), which is common in highly consuming countries (Goossens *et al.*, 2005). Common causes of drug resistance are excessive use of an antibiotic drug, an incorrect dose, and use of irrational antibiotic fixed-dose drug combinations (Soulsby, 2005). It has both medical (Cosgrove *et al.*, 2003) and economic problems (Paladino *et al.*, 2002). Hence, to minimize drug resistance the aim of WHO includes different interventions, to decrease the excessive use of a drug in both humans and animals (WHO, 2017). It needs a "One Health" approach to do this WHO with the involvement of FAO and OIE, established principles worldwide (Medina *et al.*, 2020). These recommendations are delivered as a framework for food companies (Donald, 2015) and most countries (WHO, 2002).

To prevent all those risks, should be rationally used drugs, i.e. to using it only the correct way, at the correct time, at the correct dose, and respecting the withdrawal period. Also, it's important to constantly monitor antimicrobial agent sensitivity and limit the antimicrobial agent residues that are frequently utilized in veterinary practice Also, it's important to constantly monitor antimicrobial agent sensitivity and limit the antimicrobial agent residues that are frequently utilized in veterinary practice. Also, it's important to constantly monitor antimicrobial agent sensitivity and limit the antimicrobial agent residues that are frequently utilized in veterinary practice (Barbosa *et al.*, 2005).

3. Objective

3.1. General objective

To assess animal owners' perspective and facility practice on antimicrobial medicine use in food animals in Gondar city and its surrounding.

3.2. Specific objectives

- ✓ To assess antimicrobial prescribing practice in selected health facilities
- ✓ To assess animal health facility performance in rational drug use
- ✓ To assess animal owners' knowledge, attitude, and practice about antimicrobials dispensed to animals
- ✓ To assess the animal owners' experiences in using antimicrobials for their food animals

4. Materials and Methods

4.1. Study area and Period

The study was conducted from September 7 to December 27, 2021, in selected government veterinary clinics found in Gondar city and its surrounding. Gondar is a city located in the central Gondar Zone of the Amhara region. In this Zone, 2.5 million Cattle, 1 million Goats, 1 million Sheep, 3.3 million Poultry, 0.39 million donkeys, and 6,844 mules were found but not camels (CSA, 2020).

Gondar city is situated southwest of the Simian Mountains and north of Lake Tana and found 750 Km away from the capital city, Addis Ababa. The city has a lesser Angereb river. The altitude of the city is 2133 meters above sea level. It has an average rainfall of 1000 millimeters per annum and the average minimum and maximum temperatures are 12.3^0C, and 30.7^0C respectively (WMA, 2013).

Gondar Zuria and Dembia woreda were other study areas found in the surrounding of Gondar city. Gondar Zuria district is west of Dembia and south of lack Tana. Dembia district is southwest of Gondar city, east of Gondar Zuria, and south of Lake Tana. In both districts, more than ninety percent of the population are rural inhabitants (Berhe, 2013). Farmers in the study area used a mixed crop-livestock farming system (CSA, 2007).

Figure 1: The study area map

4.2. Study design

This study conducted a cross-sectional study design. A mixed-methods concurrent design employing both quantitative and qualitative methods of data collection was used. The two methods were approved to supplement each other. Firstly, quantitative analysis was done on the assessment of prescription practice in the health facility and the animal owner's knowledge, attitude, and practice of the prescribed medicine. Next, a qualitative in-depth interview was conducted with the animal owner to acquire more information on the use of antimicrobials in food animals. A quantitative study of prescribing practice used one year of data (2013 E.C. or September 2020 to August 2021 G.C.), which was collected retrospectively. A qualitative data collection was conducted from November 29 to December 27, 2021.

4.3. Population

This study has two district populations studied under quantitative and qualitative parts. Those are named human and animal populations.

4.3.1. Source of population

For animal owners

- ✓ All animal owners' who admitted selected government veterinary clinics in Gondar city and surrounding

For prescribing indicators

- ✓ All prescriptions of food animals dispensed from each selected veterinary clinics

For facility indicators

- ✓ All facilities and all national veterinary drug list

4.3.2. Study population

For animal owners

- ✓ Food animal owners' who admitted selected government veterinary clinics in Gondar city and surrounding during the study time

For prescribing indicators

- ✓ Prescriptions of food animals were dispensed from each selected veterinary clinic in one year (2013 E.C.)

For facility indicators

- ✓ Selected twenty facilities and DACA model list of key drugs

4.3.3. Study animals

All cattle, sheep, and goats (Food animals) of all sex and age which admitted to selected government veterinary clinics in Gondar city and its surrounding and treated with antimicrobial drugs.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

For animal owners

- ✓ Having experience in administering medicines to their food animals

- ✓ Volunteer for the interview at the time of the study

For prescriptions

- ✓ Prescription of food animals that prescribe antimicrobial drugs

For health facilities

- ✓ Government health facilities providing treatment and preventive care to food animals
- ✓ Facilities are more peace full, have high patient animal flow, documented prescription paper or case registration book, and are well-organized

4.4.2. Exclusion criteria

For animal owner

- ✓ Owning food animals but who are unable to commit an adequate amount of time to the study, especially for the qualitative interviews. Because in the case of the qualitative part of the study, used a deep interview and it took time.

For prescription

- ✓ Prescription of food animals with an incomplete record
- ✓ Prescription of food animals but not prescribe antimicrobial drugs

For facilities

- ✓ closed at the time of study

4.5. Sampling and sample size

4.5.1. Quantitative study

To assess the facilities investigator used the WHO facility indicator guideline. Based on WHO recommendation, fifteen essential drugs were selected (WHO, 1993) from the national veterinary drug list (DACA, 2002), to assess availability in each governmental

veterinary clinic. These key drugs are used to manage, as a first-line, the top ten common health problems of food animals. To select those used the national list of veterinary drug (DACA, 2002) and the SVTG (DACA, 2006).

WHO recommendations stated that 20 facilities should be included to study rational drug use and a minimum of 30 prescription papers took from 20 facilities (WHO, 1993). So, a total of 20 facilities were selected from 84 governmental veterinary clinics found in Gondar town and its surrounding. Purposive sampling technique was used to select the facility. A total of 600 (30*20) cases of patient food animals were investigated in the study.

In Gondar town, 2 facilities were selected from ten government veterinary clinics (10% of a total of 20). The other 18 government clinics were selected from the surrounding two woreda. Forty government veterinary clinics in Dembia woreda, 10 facilities were selected. It is fifty percent (50%) of the total. The rest 8 clinics were selected from Gondar Zuria woreda in thirty-six government veterinary clinics. It is forty percent (40%) of a total of twenty facilities.

To assess animal owners' knowledge, attitude, and practice the investigator interviewed 600 animal owners. The participant was distributed equally. This means interviewing 30 animal owners in every 20 veterinary clinics (30*20=600), which was based on the WHO recommendation (WHO, 1993).

4.5.2. Qualitative study

The investigator used a purposive sampling technic to select food animal owners who participate in a qualitative study. There were 23 animal owners selected in twenty

facilities. This means deeply interviewing one animal owner for each government veterinary clinic and adding three persons from three clinics. Because, those three clinics had a high number of patient animal and animal owner flow also, to check if to get new ideas. The information saturation was used to recognize the final number of participants in the interview. Saturation was determined by the lack of new info from the next participant.

4.6. Study variable (only in quantitative study)

4.6.1. Dependent variable

- ✓ Knowledge, attitude, and practice
- ✓ Percent of drugs prescribed (antibiotics, injections, EDL, generic name)
- ✓ Availability of EDL, STG line, and percent of key drug

4.6.2. Independent variable

- ✓ Socio-demographic characteristics of the animal owners (such as education level, age, gender, and habitation)
- ✓ Types of professionals involved in prescribing and dispensing
- ✓ Diagnosis methods
- ✓ Residence of health facility (urban, rural)

4.7. Data collection procedures and instrument

4.7.1. Quantitative study

The source of data for the assessment of facility prescribing practice was animal patient medication profiles in the case registration book and veterinarian prescription records. A patient's animal profiles such as date of treatment, species, sex, and diagnosis were recorded from the case registration book. From prescription records, prescribed drug use,

dose, and route of administration were recorded. The sources of data to assess animal owners' knowledge, attitude and practice were animal owners themselves.

Prescribing indicators were the average number of drugs per encounter, percentage of drugs prescribed with the generic name, percentage of encounters with antibiotics and injections prescribed, and percentage of drugs prescribed from national veterinary drug list. The data of one facility's prescribing practice of antimicrobials for food animals were collected from prescription papers and the other nineteen data were collected from case registration books. Firstly their data was purposely selected from a prescription of patient food animals that prescribe antimicrobials. Then systematic random sampling technique was used to select 30 cases. Finally, the specific data was entered into an ordinary WHO prescribing indicator form (WHO, 1993) (Annex 1). In the data collection, when to say generics, antibiotics, and injections were used national veterinary drug list of DACA (DACA, 2002).

Health facility indicators were the availability of essential drugs, the availability of a copy of STGs or formularies, and EDL (WHO, 1993). Their data were collected prospectively by assessing all those on selected governmental veterinary clinics in Gondar town and surrounding. When the assessment of the availability of veterinary drug list selected 15 drugs that were used to treat 10 most affected diseases (Annex 2).

To assess animal owner knowledge, attitude, and practice about antimicrobials used for food animal structured interview questions was used and the data were collected prospectively. The questions were close-ended and face-to-face administered by the data collectors. The questions were written in both English (Annex 4) and Amharic (Annex II)

and the interview was subsisting in the Amharic language. The questions were divided into four parts. The first part was socio-demographic questions and it contains four questions. The second part is thirteen knowledge assessment questions of animal owners classified into three. From those, the first five questions were used to assess knowledge labels on antimicrobial uses. The next four questions were used to assess knowledge labels about the consequence of antimicrobial uses. The next four questions were used to assess knowledge of acts and regulations to control antimicrobial uses. The third part consisted of eight questions to assess the attitude of animal owners. Part four consisted of eleven questions to assess animal owner practice.

4.7.2. Qualitative study

The source of data to assess animal owners' was the animal owners themselves. Semi-structured, open-ended questions were used to obtain information from the animal owner on how to use antimicrobial drugs for their food animals (cattle, sheep, goats, and poultry).

Data from the qualitative study was collected by the principal investigator. The interview was collected prospectively by using audio-recorded and the interviewer kept a deep field note. The consent of participants was obtained before recording the audio. Furthermore, the interview was administered in Amharic language (Annex III) and participants identified the drugs by color. The data was converted to English language after being collected in Amharic. The interview was used to acquire deep and additional information about the use of antimicrobials for food animals in the area. To develop the questionnaire the result of the pretest was used. In the pretest 30 animal owners were interviewed which

was 5% of the total of 600 participants. The first three questions of the assessment were socio-demographic questions. The second one was having nine basic questions, which didn't include a sub-question.

Primarily, the questions used to assess animal owner perspective and knowledge, attitude, and practice were collected from different articles related to the study (Nuangmek et al., 2018, Ozturk et al., 2019, Geta and Kibret, 2021). Next, the investigator selected basic questions based on the objective of the study and wrote them. Then, the questions were edited by the advisor and two other persons. The final edition of the English version questionnaire was converted to Amharic by the investigator, advisor, and two other persons. Those two persons are experienced in research, familiar with the animal issue, and well in English and Amharic. Next, discussed and re-wrote common points of the Amharic version of the questionnaire. Finally, the questionnaire items were reviewed for content validity by the advisor.

4.8. Data analysis and interpretation

4.8.1. Quantitative study

The collected data from patient food animal medication profiles and questionnaire interviews were coded, entered, and analyzed by using IBM-SPSS software version 20. The data was evaluated by WHO guide line. Statistical significance was determined by Pearson Chi-Square test and P-value less than 0.05 was considered to be statistically significant. This was used to express the association of knowledge, attitude, and practice of animal owners with gender, age, and education label. Descriptive statistics such as

percentage, average, and frequency were used to summarize the data. To present the data using tables and graphs.

Prescribing indicator

By dividing the overall amount of various drug items prescribed via whole amount of encounters analyzed, the average amount of medicines per prescription is calculated.

By dividing the amount of prescriptions for generic names by the whole amount of prescriptions, multiplied by 100, one can determine the percentage of prescriptions for generic names.

By dividing the number of patient contacts in which a drug was prescribed by the overall number of encounters examined, multiplied by 100, the proportion of antibiotics and injections prescribed was determined.

By dividing the amounts of products prescribed that are on the veterinary drug list by the total number of prescription medications, multiplied by 100, the proportion of medications from Ethiopia's national essential veterinary drug list (EVDL) was determined (WHO, 1993; DACA, 2002).

Facility indicator

Give one mark for each key drug that was presented and a zero mark for not being presented in the stock of each selected facility during the study time. Then calculate the sum and percentage of each drug.

Knowledge, attitude, and practice

The knowledge level gave one mark for each correct answer and zero marks for each wrong or unsure response in the questionnaire. The attitude of the animal owner was level from “Strongly Agree” to “Strongly Disagree”. And animal owners practice levels from “Always” to “Never”. Then tick the answer to each both attitude and practice assessment questions. A similar calculating system was mentioned for negative statements.

Then, reported ‘good’, ‘moderate’, and ‘low’ knowledge, attitude, and practice based on the answer by using Bloom’s cut-off point. Respondents less than 60% were low level, between 60%–80% were moderate level, and more than 80% were high level (Bloom *et al*., 1956). From thirteen (13) knowledge assessment questions they were answered >10, between 10-8, and <8 questions labeled good, moderate, and low knowledge labels, respectively. From eight (8) attitude assessment questions answered, >6, 6-5, and <5 questions were labeled concerned, neutral, and non-concerned attitude, respectively. From eleven (11) practice assessment questions answered >9, 9-7, and <7 questions were labeled good, fair, and law practice, respectively.

4.8.2. Qualitative study

The qualitative data collected from the animal owner by using an audio recorder was converted verbatim. Those data were entered as a summary point and computed manually. First, the data was copied and analyzed in Amharic and then convert to English language.

The collected data was analyzed by using the thematic analysis approach. To analyze the data used color code in Microsoft word. Steps to analyze the qualitative data in the

thematic analysis were transcription and familiarization, coding, creating themes, revising themes, defining and naming themes, and writing up (Thompson, 2022). First, to familiarize me with the idea of interviews listened to recurrently. Then, identify the code of key idea in Microsoft word and give the color to organize it. During analysis to add a new idea, the code was flexible. Next, creating, revising, defining, and naming themes. Finally, writing up the result of a qualitative study. During the analysis of data in each step checked the objective of the study.

4.9. Ethical consideration

Ethical approval was gained from the Ethical Review Committee of the School of Pharmacy, College of health sciences, Addis Ababa University. Ethical clearance was obtained on August 31, 2021 (Annex IV).

Each participant in the interview has informed of the purpose and objective of the study, and then written and verbal consent was obtained. Furthermore, each participant was informed the involvement was voluntary and that they could be withdrawn from the study at any time if they are not comfortable with the questionnaire. To keep confidentiality, the info was kept by excluding names and caring for their privacy during the interview by interviewing them alone at each of the desks. The consent was written in both English and Amharic language.

4.10. Operational definition

Antimicrobials: are substances against the life of microorganisms by stopping their growth or destroying them in general (bacteria, protozoa, viruses, and fungi) (Guardabassi and Courvalin, 2005).

Food animal: An animal raised for its meat (such as cattle, pigs, and sheep) and frequently eaten after being heated through roasting, boiling, etc. (Medical dictionary, 2011).

Patient animal: an animal presented to an authorized animal health care provider to prevent or treat disease (VDFACA, 2016).

Prescription: any order for veterinary drugs written and signed by a duly licensed or authorized animal health practitioner issued to an animal patient to collect medicine from a veterinary drug dispensing outlet (VDFACA, 2016).

Veterinary drug means: any element or combination of elements used to diagnose, treat, or stop an animal disease; this includes sanitary goods, biological products, and things used to treat internal and external parasites and disease-carrying vectors (VDFACA, 2016).

6. Results

6.1. Result of a quantitative study

6.1.1. Prescribing indicators

From September 2020 to August 2021 a total of 57,601 cases of food animals were recorded on prescription paper and/or registration books. Of this, about 11,293 cases had taken antimicrobials. For the present study, 600 cases were selected from twenty facilities. Among those, the majority of the diagnoses were microbial diseases. The most commonly recorded diseases were Pasteurellosis 79 (13.2%), followed by GIT parasite 57 (9.5%), Black leg 46 (7.7%), and Mastitis 40(6.7%). The last one is Sheep pox 4 (0.7%). About 23 (3.8) of those diagnosed were mixed disease. When the prescribers couldn't identify the disease (not diagnosed) at all twenty facilities, they report systemic (septicemia) and it was 81 (13.5%) from the total.

Table 1: The number and percent of common diseases in the study area

Diagnosis / Disease		**Frequency**	**Percentage**
Bacterial disease	Anthrax	10	1.7%
	Salmonellosis	15	2.5%
Fungal disease	Dermatophytosis	10	1.7%
Viral disease	LSD	7	1.2%
	PPR (Orf)	22	3.7%
	Sheep pox	4	0.7%
Protozoan disease	Coccidosis	32	5.3%
	Trypanosomiasis	7	1.2%
Parasitic disease	GIT parasite	57	9.5%
	Lungworm	20	3.3%
	Fashiolosis	29	4.8%

Respiratory disease	CBPP	36	6%
	CCPP	12	2%
Reproductive disease	Dystocia	8	1.3%
	Mastitis	40	6.7%
Infectious disease	Blackleg	46	7.7%
	Enteritis	20	3.3%
	Pasteurellosis	79	13.2%
	Phenomena	35	5.8%
Others	Bloat	7	1.2%
	Mixed	23	3.8%
	Systemic	81	13.5%

LSD = Lymph Skin Disease, PPR = Peste Des Petits Ruminant, GIT parasite = Gastro Intestinal Tract parasite, CBPP = Contagious Bovine Phuloro Pneumonia, CCPP = Contagious Caprine Phuloro Pneumonia

A total of 883 drugs were prescribed and the highest group of antimicrobial drugs used was Oxytetracycline 378 (43%). Followed by, Penstrip (fixed combination of Dihydrostreptomycin Sulphate + Procaine Penicillin G) 183 (20.7%), and sulfa drug (Potentiated Sulpha) (fixed combination of Sulphadimidine + Trimethoprim) 45 (5.1%) and all prescribed drugs were broad spectrum.

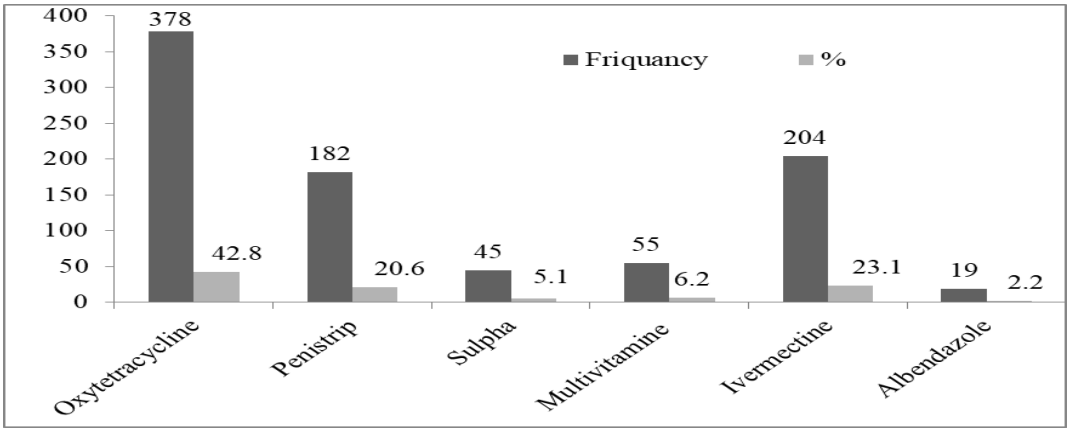

Figure 2: A graph showed the frequency of common drugs in the study area

The average number of medicines per prescription was 1.5 with a maximum of three drugs per encounter. All prescribed drugs were from national veterinary drug list prescribed by generic name (N = 883, 100%). On all selected 600 prescription papers from twenty facilities, a minimum of one antibiotic and injection were prescribed per prescription. From 883 prescribed drugs 605 (68.7%) and 864 (97.8%) were antibiotics and injections respectively. All those were identified based on the DACA essential drug list. But to assess facility prescribing practice hadn't prescribed indicator guidelines, instead used WHO guidelines.

Table 2: Prescribing indicator of veterinary clinics

Parameter	**Standard value**	**Current result Average or Percentage / Number**
Total selected prescription paper		100% / 600
The average number of drugs per prescription	1.6 - 1.8	1.5
Total prescribed drugs		100% / 883
Percentage of encounters with antibiotics prescribed	20.0 - 26.8%	68.7% / 605
Percentage of encounters with an injection prescribed	13.4 - 24.1%	97.8% / 864
Percentage of drugs prescribed from EVDLs	100%	100% / 883
Percentage of drugs prescribed by generic name	100%	100% / 883

Used WHO, 2002 as a reference

Based on the recorded document from 600 prescriptions at all facilities, 348 (58%), 221 (36.8%), and 31 (5.2%) were prescribed one, two, and three drugs respectively. Except at Gorgora veterinary clinic, others were prescribed more than one drug. More practice of

prescribed three drugs at Meskele-Kristos. The most treated species of food animals were Bovine (Cattle) (55.5%) and females (60.7%) at Burbuaks veterinary clinic. It was followed by Ovine (sheep) (36.5%), and Caprine (goats) (8%).

Table 3: Contributing factors that influence the prescribing practice of veterinary clinics

Clinic	**Factors**							
	Number of drugs			**Specious of animal**			**Sex of animal**	
	1	2	3	Bovine	Ovine	Caprine	Female	Male
Chohit	21	8	1	17	10	3	17	13
Sankisa	13	17	0	17	13	0	16	14
Gorgora	30	0	0	18	10	2	18	12
Abrigiha	20	7	3	15	15	0	20	10
Me. Kristos	8	14	8	19	10	1	18	12
Jenda	21	8	1	16	12	2	18	12
Guarhea	29	1	0	16	9	5	19	11
Koladiba	5	20	5	15	11	4	21	9
Jangua	4	23	3	14	14	2	20	10
Robit	4	24	2	17	11	2	13	17
Maksegnt	17	11	2	18	10	2	20	10
Enfiranze	22	7	1	15	14	1	20	10
Tseda	24	5	1	15	12	3	20	10
Mniziro	20	9	1	16	11	3	22	8
Burbuaks	19	10	1	20	10	0	21	9
Jayira	14	14	2	15	9	6	21	9
Denzaz	23	7	0	17	7	6	20	10
Bahiriginib	20	10	0	17	8	5	14	16
UoG	16	13	1	17	12	1	16	14
Ha. Pawlos	16	14	0	19	11	0	10	20
Total	347	222	31	333	219	48	364	236

UoG= University of Gondar, Ha. Pawlos= Hawariaw-Pawlos, Me. Kristos= Meskele-Kristos

6.1.2. Facility indicators

The figure below showed in the study time from fifteen drugs, the percentages of Oxy-tetracycline, Albendazole, and Ivermectin were 100% (20) for each. But each of Grisofulvin and Ketoconazole was zero percent (0 of 20). Potentiated-Sulpha, Tylosine, and Xylazine were ten percent (2 of 20). All other seven drugs were between sixty (60%) to ninety-five percent (95%).

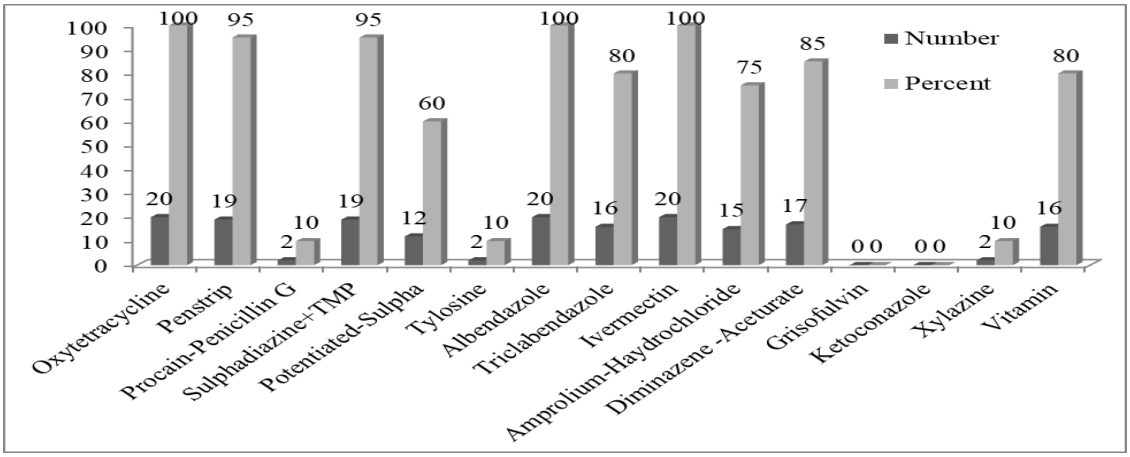

Figure 3: The bar graph showed the number and percentage of selected fifteen drugs

The result of this study showed that during the study time from a total of fifteen drugs three drugs were found in all selected veterinary clinics but two drugs weren't found at all. Averagely 9 drugs (60%) were obtainable in each facility. A large number of drugs were obtained at the University of Gondar and Hawariaw-Pawlos veterinary clinics, it was 12 (80%) on each. Fewer drugs were found in Burbuaks, Jayira, Denzaz, and Bahiriginib veterinary clinics and it was 6 (30%) drugs in each. Eight (40%) of twenty facilities had their treatment guideline. And five (25%) of them had both national veterinary drug list or formularies and SVTG. Those veterinary clinics were Chohit,

Koladiba, Maksegnt, University of Gondar, and Hawariaw-Paulos. However, seven (35%) veterinary clinics hadn't both veterinary drug list or formularies and SVTG.

Table 4: Distribution of key drugs and presence of national veterinary drug list and SVTG at twenty veterinary clinics

Clinics	**Selected drugs**															**Total N (%)**	**National veterinary drug list**	**SVTG**
	Oxytetracycline	Penstrep	Procaine-Penicillin G	Sulpha+TMP	Potentiated-Sulpha	Tylosine	Albendazole	Triclabendazole	Ivermectin	Amprolium-H.	Diminazene-Aceturate	Grisofulvin	Ketoconazole	Xylazine	Vitamin			
Chohit	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	11(66.7)	1	1
Sankisa	1	1	0	1	1	0	1	1	1	1	1	0	0	0	1	10(66.7)	0	0
Gorgora	1	1	0	1	1	0	1	1	1	1	1	0	0	0	1	10(66.7)	0	0
Abrigiha	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	10(66.7)	0	1
Meskele-kristos	1	1	0	1	1	0	1	1	1	1	1	0	0	0	0	9(60.0)	0	0
Jenda	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	9(60.0)	0	1
Guarhea	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	10(66.7)	0	1
Koladiba	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	11(73.3)	1	1
Jangua	1	0	0	1	1	0	1	1	1	1	1	0	0	0	1	9(60.0)	0	0
Robit	1	1	0	1	1	0	1	1	1	1	1	0	0	0	0	9/60.0	0	0
Maksegnt	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	10(66.7)	1	1
Enfiranze	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	9(60.0)	0	1

Tseda	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	9(60.0)	0	1
Mniziro	1	1	1	0	0	0	1	1	1	0	1	0	0	0	1	7(46.7)	0	1
Burbuaks	1	1	0	1	0	0	1	0	1	0	1	0	0	0	0	6(40.0)	0	0
Jayira	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	6(40.0)	0	1
Denzaz	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	6(40.0)	0	1
Bahiriginib	1	1	0	1	0	0	1	1	1	0	0	0	0	0	0	6(40.0)	0	0
University of Gondar	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	12(80.0)	1	1
Hawariaw-Pawlos	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	12(80.0)	1	1
Sum	20	19	13	19	12	2	20	16	20	15	17	0	0	2	16	180	5	13
Overall summations, the average of drugs and percentage = 180, 9, 60%																	25 %	65 %

Yes=1, No=0

Sulpha+TMP = Sulphadiazine + Trimethoprim, Amprolium-H. = Amprolium Hydrochloride, SVTG line = Standard Veterinary Treatment Guideline.

6.1.3. Animal owner Knowledge, Attitude, and Practice

Socio-demographic characteristics of animal owners

In the current study from the whole participant, 88% (528) were males and 12% (72) were female. About 540 (90%) and 60 (10%) of them lived in rural and urban areas respectively. Nearly 60.8% of them were uneducated and 38 (6.3%) of them had Diploma & Degree. Around 62.3% (374) of the participants were under the age category of 25-54% and 5% (30) of them were >65 years. The minimum age of the participant was 15 and the maximum was 71 years old. The mean and standard deviation of the age was 40.97 and 14.3 respectively.

Table 5: Showed the number and percentage of animal owner features

Animal owner features		Number	Percentage	Mean	SD
Participant habitat	Urban	60	10%	1.90	0.30
	Rural	540	90%		
Gender	Male	528	88%	1.12	0.32
	Female	72	12%		
Age	15- 24	90	15.0%	40.97	14.29
	25 - 54	374	62.3%		
	55-64	106	17.7%		
	>65Years	30	5%		
Education	Uneducated*	365	60.8%	2.06	1.63
	Grade 1-4	59	9.8%		
	Grade 4-8	71	11.8%		
	Grade 9-10	37	6.2%		
	Grade 11-12	30	5.0%		
	Diploma	23	3.8%		
	Degree	15	2.5%		

* *Persons who have not started formal education.*

Animal owners' knowledge regarding antimicrobial use in twenty facilities

According to the study, a large number of animal owners know antimicrobials are used for bacterial treatment and control (488 (81.3%)), and using the proper dosage can lead to increase drug effectiveness (484 (80.7%)). In addition, 78.8% (473) of them have had an awareness about antimicrobial drugs should be stored in a secure place under the manufacturers' recommendation and 75.8% (455) of them know when antimicrobials aren't used prudently drug resistance may occur. About 50.5% and 62.3% of participants had low knowledge about antimicrobial drugs remaining in meat, milk, and egg and

adherence to the drug withdrawal period used to avoid drug residues in meat, milk, and egg, respectively. About 60.2% (361) of participants weren't aware growth promoters or prophylactic drugs cause a problem like a drug resistance.

Table 6: Result of Knowledge assessment questions

No	Questions	Frequency (Percentage)	
		Yes N (%)	No N (%)
1	AMs use for bacteria treatment and control	488 (81.3%)	112 (18.7%)
2	Interaction among using multi AMs drug used at the same time reduce the efficacy	372 (62.0%)	228 (38.0%)
3	AMs stored in a secure place	473 (78.8%)	127 (21.2%)
4	AMs remain in meat, milk, and egg	297 (49.5%)	303 (50.5%)
5	The drug withdrawal period should adhere	226 37.7%)	374 (62.3%)
6	AMs not used prudently cause resistance	455 (75.8%)	145 (24.2%)
7	Non-therapeutic use of AMs causes a problem	239 (39.8%)	361 (60.2%)
8	AMs use in proper dosage increases drug efficacy	484 (80.7%)	116 (19.3%)
9	The efficacy of the drug reduces when used for a long time	356 (59.3%)	244 (40.7%)
10	Ethiopia has laws and regulations for drug use	334 (55.7%)	266 (44.6%)
11	AMs should be approved by a competent authority	300 (50.0%)	300 (50.0%)
12	AMs sale and distributed by a permitted person	392 (65.3%)	208 (4.7%)
13	Veterinarians are responsible for their prescription	331 (55.2%)	269 (44.8%)
	Total / Average (%)	4747/365 (60.8%)	3053/235 (39.2%)

The correct answer is yes. No includes no and not sure answers.

Table 7 below indicated that from all facilities a high percentage of questions (81.8%) were answered correctly at Meskele-Kristos veterinary clinic, which were approximately 11 from 13 questions or 319 from 390. Followed by Chohit (295) and Koladiba (291) veterinary clinics, in which 75.6% and 74.6% respectively, or 10 questions were answered correctly in each of both facilities. But only 36.9% at Burbuaks, 40.5% at Abrigiha, and 42.5% at Bahiriginib veterinary clinics were answered correctly. Generally, from 600 participants 365 (60.8%) of them answered correctly (said yes).

Table 7: Frequency of true knowledge assessment result at twenty veterinary clinics

Clinics	**The correct result of knowledge assessment questions**													**Total (%) from 390= 30*13**
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Q11**	**Q12**	**Q 13**	
Chohit	30	22	28	22	23	28	19	29	18	20	16	22	18	295 (75.6)
Sankisa	18	15	27	15	8	30	9	29	14	27	17	19	14	242 (62.1)
Gorgora	28	18	28	15	16	23	15	22	19	15	4	13	10	226 (57.9)
Abrigiha	17	8	19	13	8	16	6	13	9	11	10	18	7	158 (40.5)
Meskele-kristos	28	26	30	23	5	25	19	28	25	29	25	29	27	319 (81.8)
Jenda	30	16	17	9	7	17	16	25	22	19	20	19	20	237 (60.8)
Guarhea	29	20	27	20	20	25	11	29	18	12	14	24	10	259 (66.4)
Koladiba	28	27	24	12	10	27	22	24	20	24	23	25	25	291 (74.6)
Jangua	19	18	18	23	18	19	18	25	20	17	20	24	22	261 (66.9)
Robit	26	19	21	16	18	21	22	25	23	19	15	18	19	262 (67.2)
Maksegnt	29	19	26	17	15	23	6	27	23	18	24	27	21	275 (70.5)

Enfiranze	28	18	28	18	15	22	10	26	23	15	18	24	21	266 (68.2)
Tseda	26	23	26	13	13	20	11	25	20	23	23	27	25	275 (70.5)
Mniziro	24	18	21	11	5	20	9	22	13	12	17	16	11	199 (51.0)
Burbuaks	14	21	17	8	5	17	5	13	11	11	6	10	6	144 (36.9)
Jayira	27	21	27	18	15	27	7	25	7	7	7	20	19	227 (58.2)
Denzaz	21	15	24	13	8	23	4	23	16	15	10	13	12	197 (50.5)
Bah.	16	13	10	5	5	23	20	19	21	4	5	11	14	166 (42.6)
UoG	23	15	27	11	4	23	5	28	14	16	11	17	13	207 (53.1)
Ha. Paulus	27	20	28	15	8	26	5	27	20	20	15	16	17	244 (62.6)
Total	488	372	473	297	226	455	239	484	356	334	300	392	331	4747 on 7800 237 on 390 365 on 600 60.8%
Percent (600)	81.3 %	62.0 %	78.8 %	49.5 %	37.7 %	75.8 %	39.8 %	80.7 %	59.3 %	55.7 %	50.0 %	65.3 %	55.2 %	

Q1, Q2….Q13 = Question1, Question 2... Question13. Bah= Bahiriginib, Haw. Paulus = Hawariaw-Paulus, UoG = University of Gondar.

An attitude of Animal owners at twenty facilities on antimicrobial use

The greatest number of animal owners considered consulting a veterinarian before giving AMs (73.3%) and following their instructions during drug administration (73.5%). About 73.9% and 68.3% of animal owners respectively agreed on AMs are safe when purchased from legally permitted places and AMs drugs used wrongly cause different problems. Approximately half of the animal owners answered correctly the questions that said, only the cost of the drug wasn't an important reason for choosing (53.8%), and strong enforcement of laws is used to reduce resistance (51.3%). Of the total animal owners, 35% of them disagreed with the non-therapeutically use of drugs as the cause of resistance.

Table 8: Frequency and percentage result of all attitude assessment questions

No	Questions	Frequency (%)				
		S.A.	A.	N.	D.A.	S.D.A.
1	AMs used for disease protection have problem	169 (28.2%)	152 (25.3%)	124 (20.7%)	120 (20.0%)	35 (5.8%)
2	AMs not to give before consulting a veterinarian	221 (36.8%)	219 (36.5%)	72 (12.0%)	72 (12.0%)	16 (2.7%)
3	Non-therapeutic use of AMs causes resistance	116 (19.3%)	142 (23.7%)	132 (22%)	152 (25.3%)	58 (9.7%)
4	Drug administration follows veterinarian instruction	196 (32.7%)	245 (40.8%)	83 (13.8%)	58 (9.7%)	18 (3.0%)
5	AMs are safe when purchased on legally permitted	211 (35.2%)	232 (38.7%)	84 (14.0%)	48 (8.0%)	25 (4.2%)
6	Inappropriate use of AMs causes a problem	209 (34.8%)	201 (33.5%)	97 (16.2%)	65 (10.8%)	28 (4.7%)
7	Strong enforcement of the law reduces resistance	141 (23.5%)	167/ (27.8%)	138 (23.0%)	112 (18.7%)	42 (7.0%)
8	Only the cost of the drug isn't an important reason for choosing	186 (31.0%)	137 (22.8%)	79 (13.2%)	139 (23.2%)	59 (9.8%)
Total /average (%)		S.A.=1449/181 (30.1%) A. =1495/187 (31.2%) Total correct answer from 600 = 368 (61.3%)		809 / 101 (16.8%)	766 / 96 (15.9%)	281 / 35 (5.8%)

S.A. = Strongly Agree, A. = Agree N. = Neutral, D.A. = Disagree, S.D.A. = Strongly Disagree. Agree was the right response and include strongly agree and agree; disagree includes strongly disagree and disagree

The participant at most selected governmental veterinary clinics answered correctly half and more questions. Especially at Enfiranze veterinary clinic (164 (68.3%)) answered correctly 6 questions from 8 questions. But at Bahiriginib veterinary clinic only 3 or 37.5% (90) of questions were answered correctly. About 368 or 61.3% of the participant responded correctly (said agree) to all attitude assessment questions.

Table 9: The number of concerned attitude assessment results at twenty veterinary clinics

Clinics	**The concerned result of attitude assessment questions**								**Total(%) from 240= 30*8**
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	
Chohit	17	18	5	27	28	27	27	22	171 (71.2%)
Sankia	10	20	4	29	26	23	20	13	145 (60.4%)
Gorgora	23	29	10	13	20	21	16	27	159 (66.2%)
Abrigiha	13	18	11	14	17	14	9	11	107 (44.6%)
Me. Kristos	28	25	12	25	28	16	15	5	154 (64.2%)
Jenda	16	16	12	13	21	15	9	16	118 (49.2%)
Guarhea	22	28	10	22	25	21	20	13	161 (67.1%)
Koladiba	16	21	14	23	23	23	17	17	154 (64.2%)
Jangua	15	11	15	13	12	15	10	11	102 (42.5%)
Robit	25	14	19	27	22	19	16	20	162 (67.5%)
Maksegnt	12	21	10	27	27	23	23	17	160 (66.7%)
Enfiranze	13	24	14	25	25	22	22	19	164 (68.3%)
Tseda	19	18	15	22	24	20	19	14	151 (62.9%)
Mniziro	17	27	10	26	20	23	16	22	161 (67.1%)
Burbuaks	22	26	14	24	18	16	11	13	146 (60.8%)
Jayira	9	29	17	29	15	29	6	6	140 (58.3%)
Denzaz	13	19	11	21	24	26	19	22	155 (64.6%)
Bahiriginib	9	19	16	12	12	10	4	6	90 (37.5%)

UoG	8	29	10	25	26	19	13	19	149 (62.1%)
Ha. Pawlos	14	28	29	24	26	30	16	30	195 (81.2%)
Total	321	440	258	441	443	410	308	323	2944 on 4800
Percentage (600)	53.5 %	73. 3%	43. 0%	73. 5%	73.8 %	68. 3%	51. 3%	53.8 %	147 on 240 368 on 600 (61.3%)

Q1, Q2….Q8 = Question1, Question 2... Question8. The Me. kristos = Meskele- kristos, UoG = University of Gondar. Ha. Pawlos = Hawariaw- Paulos

The practice of participants on antimicrobial use in selected facilities

Around half of the participants always placed AMs in a proper location in the house (49.3%) and during drug administration follow the recommendation of veterinarians (49.0%). Furthermore, 53.7% of them said that always veterinarians were responsible for drug prescriptions. But 33.5% of them never adhered withdrawal period before sending the slaughterhouse. From seven opposite questions, fifty percent of the participant responded correctly when animals feel better after the first day of treatment never stop providing drugs* (53.3%), and never use multiple drugs to increase efficacy* (50.0%). About 44% of them never used a drug before consulting a veterinarian* and 38.0% of them also never used the same drugs for a long time *. Sometimes animal owner practice giving AMs without disease outbreak* (36.3%) and increasing the dose & frequency of the drug when the animal didn't show recovery* (33.2%) (Table10).

A large number of participants answered the most correct response at Chohit veterinary clinics (219), which means each of them answered 7 (66.4%) from 11 questions. However, at Bahiriginib veterinary clinic they correctly answered 2 questions. In this study, a total of 248 (41.3%) participants were given correct responses to practice assessment questions (Table 11).

Table 10: Showed the frequency and percentage of practice assessment results

Questions	Frequency (%)			
	Always	**Usually**	**Sometimes**	**Never**
1. Always Vet. are responsible for drug prescription	322 (53.7%)	181 (30.2%)	59 (9.8%)	38 (6.3%)
2. During AMs administration follow a recommendation	294 (49.0%)	155 (25.8%)	99 (16.5%)	52 (8.7%)
3. Adhere withdrawal period before sending a slaughterhouse	127 (21.2%)	117 (19.5%)	143 (23.8%)	213 (33.5%)
4. AMs place proper location in the house	296 (49.3%)	146 (24.3%)	104 (17.3%)	54 (9.0%)
Sum/average (%)	1039/260 (43.2%) (Correct)	788/150/ (25%)	512/102/ (17.0%)	400/89/ (14.8%)
5. Used drug before consulting veterinarian*	43 (7.2%)	104 (17.3%)	189 (31.5%)	264 (44%)
6. Used AMs on food animals only for prevention purposes *	103 (17.1%)	160 (26.7%)	166 (27.7%)	171 (28.5%)
7. AMs use without disease outbreak*	104 (17.3%)	119 (19.8%)	218 (36.3%)	159 (26.5%)
8. To increase efficacy use multiple drugs*	57(9.5%)	87(14.5%)	156(26.0%)	300(50.0%)
9. Use similar drugs for a length of time*	80(13.3%)	120(20.0%)	172(28.7%)	228(38.0%)
10. Animal does not show recovery increase dose & frequency of drug*	73 (12.2%)	95 (15.8%)	199 (33.2%)	233 (38.8%)
11. Animals feel better after the first day of Rx stop providing drugs*	49 (8.2%)	65 (10.8%)	166 (27.7%)	320 (53.3%)
Sum/average (%)	509 / 73 (12.2)	750/107 (17.8)	1266/181 (30.2)	1675/239(39.8) (Correct)
Overall correct result/average (%)	2714 / 248 (41.3)			

** Shows opposite questions. The right answer is always but on opposite questions, the right answer is never*

Table 11: Selected veterinary clinic with the correct response to practice assessment questions

Clinics	**The correct result of practice assessment questions**											**Total (%) from 330=11*30**
	Q1	Q2	Q3	Q4	Q 5	Q 6	Q 7	Q8	Q9	Q 10	Q 11	
Chohit	24	23	16	22	23	12	13	22	20	25	19	219 (66.4)
Sankisa	23	25	2	26	14	4	2	25	24	8	27	180 (54.5)
Gorgora	15	22	8	13	26	8	7	10	10	10	9	138 (41.8)
Abrigiha	16	11	12	11	5	8	8	11	12	8	18	120 (36.4)
Meskele-kristos	19	16	3	21	19	7	3	17	13	5	24	147 (44.6)
Jenda	16	6	3	19	8	8	6	7	8	6	7	94 (28.5)
Guarhea	23	16	8	12	21	2	0	20	7	0	6	115 (34.9)
Koladiba	15	18	9	14	15	3	5	12	5	13	11	120 (36.4)
Jangua	26	16	9	6	17	5	8	7	8	8	10	120 (36.4)
Robit	13	11	8	10	5	5	10	3	10	7	19	101 (30.6)
Maksegnt	21	21	9	17	19	5	9	21	12	20	16	170 (51.5)
Enfiranze	22	21	8	26	22	7	6	19	16	16	20	183 (55.4)
Tseda	3	4	6	13	2	3	9	14	9	10	26	99 (30)
Mniziro	13	16	5	24	17	13	9	10	9	14	10	140 (42.2)
Burbuaks	13	7	7	11	7	13	17	19	17	19	20	150 (45.5)
Jayira	9	18	5	20	0	4	7	22	7	14	19	125 (37.9)
Denzaz	9	11	3	13	9	11	16	20	16	9	18	135 (40.9)
Bahiriginib	2	1	2	3	0	10	8	7	8	8	12	61 (18.5)
University of Gondar	22	17	2	5	17	21	10	19	10	19	17	159 (48.2)
Hawariaw-pawlos	18	14	2	10	18	22	6	15	7	14	12	138 (41.8)
Total	322	294	127	296	264	171	159	300	228	233	320	2714 on 6600
Percentage	53.7%	49.0%	21.2%	49.3%	44.0%	28.5%	26.5%	50.0%	38.0%	38.8%	53.3%	136 on 330 248 on 600 41.3%

Q1, Q2….Q11 = Question1, Question 2... Question11

To express the association of knowledge, attitude, and practice of animal owners with gender, age, and education label used the Pearson chi-square test and the significance was set at a p-value of $P<0.05$. Only education was statically significant in association with knowledge, attitude, and practice ($P<0.05$).

From 365 correct respondents to knowledge assessment questions, 324 (88.8%) were males and 41 (11.2%) were females. Moreover, 288 (78.9%) were under the age of 54 and 77 (21.1%) were above the age of 55 years. Furthermore, 173 (47.4%) were uneducated and 192 (52.6%) were educated.

From 368 correct respondents to attitude assessment questions, 326 (88.6%), 42 (11.4%), 289 (78.5%), and 79 (21.5%) were male, female, under the age of 54, and above the age of 55 years, respectively. Additionally, 193 (52.4%) were uneducated and 175 (47.6%) were educated. From 248 correct respondents to practice assessment questions, 215 (87.0%), 32 (13.0%), 118 (47.8%), and 129 (52.2%) were male, female, uneducated, and educated. Also, 196 (79.3) were under the age of 54 and 51 (20.7%) were above the age of 55 years.

When comparing the correct responses with each total, males, under the age of 15-25 years, and educated participants responded large percentage of knowledge, attitude, and practice assessment questions. Males were responding 61.4%, 61.7%, and 44.4% to knowledge, attitude, and practice assessment questions respectively. Plus under the age of 15-25 years were respond 81.1% on knowledge, 75.5% on attitude, and 60.3% on practice assessment questions. Moreover, the participants that had a Diploma & Degree responded correctly to 89.5%, 86.8%, and 65.8% of knowledge, attitude, and practice

assessment questions from each total participant, respectively ($p<0.05$). However, uneducated participants responded low percentage of questions which were 47.4%, 52.9%, and 32.3% of knowledge, attitude, and practice questions from each total, respectively.

Table 12: Showed animal owner knowledge, attitude, and practice affecting factors

	Correct result		
Character	**Frequency (Percent) (Percentage from each total)**		
	Knowledge	**Attitude**	**Practice**
	Gender		
Male	324 (88.8) (61.4%)	326 (88.6%) (61.7%)	215 (87.0%) (44.4%)
Female	41 (11.2%) (56.9%)	334 (11.4) (58.3%)	32 (13.0%) (40.7%)
P- value		>0.05	
	Age		
15 – 25	73 (20.0%) (81.1%)	68 (18.5%) (75.5%)	54 (21.8%) (60.3%)
26 – 54	215 (58.9%) (57.5%)	221 (60%) (59.1%)	142 (57.5%) (38.3%)
55 – 64	60 (16.4%) (56.6%)	61 (16.6%) (57.1%)	39 (15.8%) (36.8%)
>65	17 (4.7%) (56.6%)	18 (4.9%) (60%)	12 (4.9%) (40%)
P- value		>0.05	
	Educations		
*Illiterate	173 (47.4%) (47.4%)	193 (52.4%) (52.9%)	118 (47.8%) (32.3%)
1-12	158 (43.3%) (80.2%)	142 (38.6%) (72.1%)	104 (42.1%) (5.8%)
Dep.& Deg.	34 (9.3%) (89.5%)	33 (9.0%) (86.8%)	25 (10.1%) (65.8%)
P-value		<0.01	

** Persons who have not started formal education; Dip & Deg = Diploma and Degree.*

Generally, based on the response of participants Bloom of cut point labeled knowledge, attitude, and practice into three, which were who respond greater than 80%, 60%-80%,

and less than 60% of questions (Bloom *et al.*, 1956). From thirteen knowledge assessment questions the person that answered >10 (>312 of 390), between 10-8 (312-234 of 390), and <8 questions (<234 of 390) labeled good, moderate, and low knowledge, respectively. Therefore, about drug use for animals from whole participants 40, 368, and 192 of them had good, moderate, and low knowledge. About 39, 451, and 110 participants were concerned, neutral, and non-concerned attitude. This means from eight questions each of them answered >6 (>192 of 240), 6-5 (192-144 of 240), and <5 questions (<144 of 240), respectively. From the practice assessment of eleven questions, no one answered correctly greater than 9 questions (>264 from 330), so none of them had a good practice. From a total of 600 respondents, 48 of them had fair and 552 had low practice. This means they answer 9-7 (264-198) and <7 questions (<198) respectively.

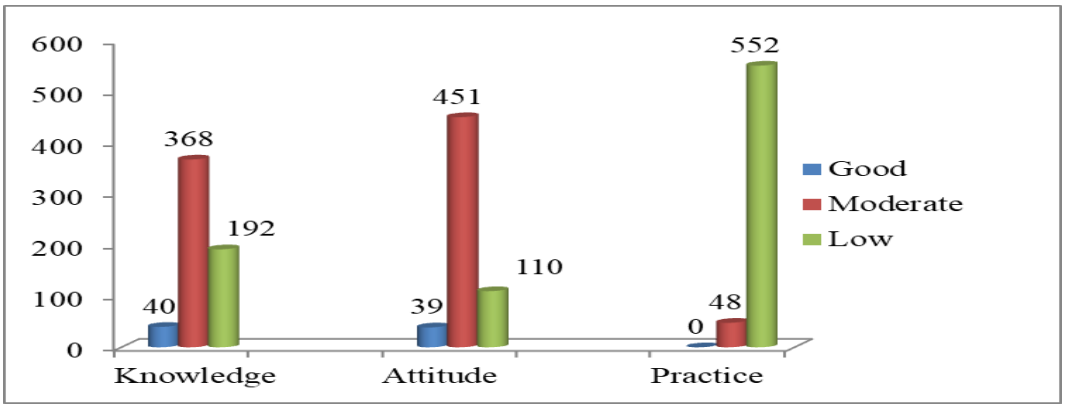

Figure 4: Number of participant knowledge, attitude, and practice labels

Out of 600 participants, 26 (4.3%), 289 (48.2%), and 285 (47.5%) of them had good, moderate and low KAP respectively.

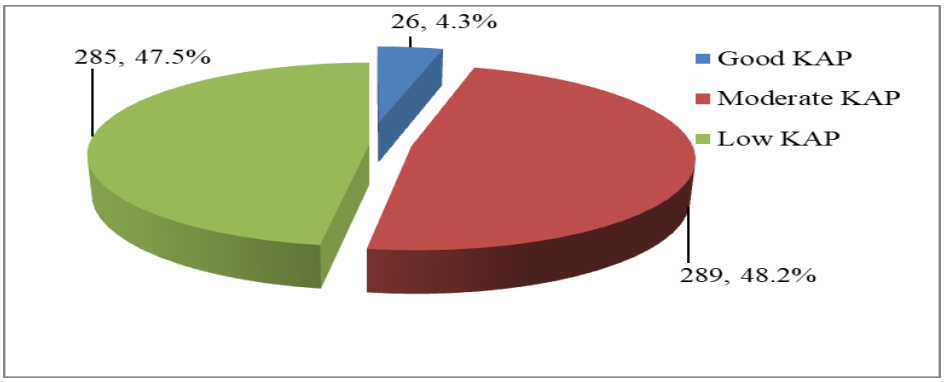

Figure 5: Number and percentage of overall participants KAP

6.2. Qualitative study result

6.2.1. Participant characteristics

In this study, twenty-three animal owners were interviewed deeply during their exit from twenty selected governmental veterinary clinics. About eighteen of them were male and five of them were female and most of them were under the age of 26-54 years. The majority of participants were uneducated during the interview. One female had a primary level of education and 4 males learned grade one up to a Degree, and 18 of them were illiterate.

Table 13: Characteristics of qualitative study participants

Characteristics		**Number**
Gender	Male	18
	Female	5
Age	26 – 54	16
	55 – 64	5
	>65	2
Education	uneducated *	18
	Grade 1-12	3
	Diploma & Degree	2

** Persons who have not started formal education.*

6.2.2. Identified major themes in data analysis

During the analysis of qualitative data, four major thematic areas were identified. These include their aim to bring their animal to a health facility, use of antimicrobials for an animal, acknowledgment of the proper uses of drugs, and reason for drug use without recommendations of a professional. Below is a presentation of the key findings under each major theme and the associated sub-theme.

I. Aim of the animal owners is to bring their animals to the health facility

The necessity of an animal health center was frequently acknowledged by the participants. Participants who consider bringing sick animals to a medical facility are crucial for their animals as well as for themselves since they can get the animals treated well at a reasonable price. Due to this, the majority of animal owners were always taken with the patient animal to the medical institution. The perspectives expressed by participants concerning bringing animals to a health institution are reflected in the quotes that follow.

"*…I take animals to nearby veterinary facilities when I notice they are ill. Because I believe the animal was treated properly and the animal was recovered early"* [*Male, animal owner in Chohit veterinary clinic*]

"*…If my animal was ill, I would take it to a medical center, because I believe the hospital had a variety of essential therapy tools, including medications, and professionals provide my animal with affordable, high-quality care*" [*Male, educated (have Diploma), animal owner in Hawariaw-Pawlos veterinary clinic*]

Most participants agreed that sick animals can be identified by their movements and physical change before being taken to a medical facility. The most common symptoms of ill animals included prolonged periods of sleep, reduced feeding, weight loss, watery diarrhea, foul-smelling urine, coughing up mucus, standing hair on the animal, skin lesions or bumps, and abdominal distention. The quotes below represent participants' views on how to recognize a sick animal.

"*…If an animal becomes ill, they are unable to hold their heads up properly, fall to the ground, and have skin that resembles a smock*" (*Male, 41 years old, animal owner in Tseda veterinary clinic*)

"*…Animals, particularly cattle during the summer, may exhibit abdominal distention (bloat), which because animals consume warm grass called wajima* [*Male, educated (grade 10), animal owner in Mniziro veterinary clinic]*

"*…when the animal is sick, the body was shivering and has nasal discharge"* (*Male, animal owner in Burbuaks veterinary clinic*)

II. Uses of antimicrobials for animal

Generally speaking, participants agreed that using antimicrobials for their animals was vital. Participants reported that antimicrobial medications for animals, particularly for bovine, ovine, and caprine, were always employed as treatments or growth promoters.

Common Drugs

The majority of participants used color to categorize widely used medicines. According to their description, the most popular medications were Oxytetracycline, Ivermectin,

Penstrep, and Albendazole. The following quote represents participants' opinions about mostly used drug identification in color.

"*…Majority of the time I received medication for animals in tablet form. That medication was utilized in various colors according to the season. This indicates that green tablets are used in the winter and red tablets are used in the summer (Albendazole) [Male, educated (Degree), animal owner in university of Gondar veterinary clinic]*

"...Always administered by medical personnel, these injectable medications have a water-like hue (Ivermectine) [Male, educated (grade 12), animal owner in Maksegnt veterinary clinic]

"...The most popular injectable medications that experts utilized were white in hue (Penstrep)" [Female, educated (grade 8), animal owner in Koladiba veterinary clinic]

"...I'm not sure of a drug's specific hue, but the bottle color of that drug looks brown. This medication was given by specialists, thus the main issue in identifying the precise color was due to my failure to pay attention to the medication's differences (Oxytetracycline) [Male, illiterate, animal owner in Sankisa veterinary clinic]

Most animal owners bought drugs in the veterinary clinic because they feel these medications are superior to others in terms of quality, availability, affordability, and efficacy. The quotes that follow represent participants' views on the reasons they purchased medications from veterinary clinics.

"*… Yes! Always I bought drugs in veterinary health facilities because I believe the drugs were more effective than in other places. For the reason that the drug in other places*

(market) may expire" [*Male, educated (grade 10), animal owner in Mniziro veterinary clinic*]

"*…Since I believed that the cost of drugs at health facilities was lower than that of other locations, I typically purchased medications from veterinary health facilities" [Male, 57 years old, animal owner in Guarhea veterinary clinic*]

III. Proper use of drugs

Participants thought it was crucial to utilize medications properly for both themselves and their animals. Participants should seek professional advice during selection, and use/administration of medications, and also implement professional advice properly to improve the right use of antimicrobials.

A. Drug selection

The majority of animal owners who took part in the survey need professional advice when choosing a medicine. All of them require high-benefit, low-cost medications at the time of drug selection, although they focus more on benefits than on costs. The viewpoints of the participants about drug choice are reflected in the quotes below.

"*…When choosing medications, I was often asked for the advice of animal health professionals, and I needed medications with more benefits at lower costs. However, I preferred the medicine with a high benefit-to-cost ratio to one with a low benefit-to-cost ratio" [Male, educated (grade 12), animal owner in Maksegnt veterinary clinic]*

"*…Because they were provided a brief explanation of the drug's advantages and disadvantages, I think professional recommendations were crucial in helping people*

choose their medications. As a result, I was frequently asked for recommendations of them. For instance, if they tell me that the first drug has a high benefit at a low cost, the second drug has a low benefit at a high cost, the third drug has a high benefit at a low cost, and the fourth drug has a low benefit at a high cost, I would prefer the first drug" [*Male, educated (Degree), animal owner in University of Gondar veterinary clinic]*

B. Drug use/administration

Most individuals were required to seek professional guidance before consuming medicines. Because they think that using drugs before a doctor's advice causes economic loss and harm to animals. As a result, the majority of animal owners asked the advice of professionals to understand the dose, dosage, frequency, and how to administer antimicrobials to animals. The opinions of the participants are reflected in the following quotes.

"*…I seek professional counsel before using drugs because I think it's crucial to use a drug safely and effectively on animals" [Male, educated (have Degree), animal owner in University of Gondar veterinary clinic]*

"*…Yes! Before using drugs, I wanted the advice of professionals. Because I am unfamiliar with how to administer medications to animals, particularly the dose for each species"* [*Female, illiterate, animal owner in Maksegnt veterinary clinic*]

Except for one, all other animal owners didn't give their animal human medications, and vice versa. They did this because they believed that medications for animals were less

expensive than those for humans. The views expressed in the quotes below by participants are against administering drugs to animals and vice versa.

"*…I didn't use human pharmaceuticals on animals since they were more expensive because drug costs varied depending on the species" [Male, animal owner in Denzaz veterinary clinic]*

"…I'm not sure what the effects would be if I had used human drugs on animals, but I didn't use it" *[Male, illiterate, animal owner in Bahiriginib veterinary clinic]*

C. Implement professional advice

The majority of participants follow the advice of professionals appropriately. Because they believe that these promote effective and safe drug use. As a result, the majority of them continued to provide the medications as prescribed and did not raise the dosage or frequency if the animal showed no signs of recovery instead, the animal was returned to the clinic. Moreover, if the animal recovered on the first day of therapy, the dose and frequency weren't decreased or stopped. Additionally, they claimed that after bringing the drug home, they always placed it in the right spot and didn't give it or sell it to anyone else. Implement the professional recommendations in light of the participant viewpoints expressed in the quotes from the discussion below.

"*…if my animal didn't show any signs of improvement, I continued to give the medications as directed and didn't increase the dose (quantity) or frequency of the drug; instead, I brought the animal back to the veterinary clinic. Because I believe that there*

may be other unresolved issues with animals as the root of this" [*Male, animal owner in Jayira veterinary clinic*]

"*…even if my animal healed on the first day of treatment, I would not reduce the dosage or stop giving it since I believe that keeping a medicine regimen up to date is vital for the future of animal's health*" [*Female, animal owner in Robit veterinary clinic*]

"*…after bringing the drug in home, I always placed it in the right spot to prevent drug expiration and didn't give it or sell it to anyone else because mostly I bought few numbers of a drug*" [*Male, 36 years old, animal owner in Jangua veterinary clinic*]

IV. Reason for drug use without recommendations of professional

Sometimes a few numbers of participants didn't ask the recommendation from professionals before drug use for animals. And they would treat animals by using their traditional knowledge rather than bringing it to the veterinary clinics. Moreover, a few of them sometimes bought drugs on the market and a single person stated that he was using human drugs for animals.

Based on the participant's description the main reasons for drug use before asking for recommendations from professionals were confident in their traditional knowledge, the health center was quite a distance from their house and occasionally closed. Lack of facilities, professionals, and drugs are also other reasons. The opinions of the participants are reflected in the following quotes.

"…sometimes I didn't ask recommendations of professionals instead ask the recommendation of friends because I have the confidence of me and my friend previous knowledge" [*Male, illiterate, animal owner in Guarhea veterinary clinic*]

"*…I occasionally used my traditional knowledge to treat sick animals because I am well versed in certain diseases like bloat. When simple bloats in cattle occur, I give them oil, but because the level was high, I had to puncture one side of the abdomen* [*Male, 59 years old, animal owner in Meskele-Kristos veterinary clinic*]

"*…Because the clinic was far from my residence, I occasionally chose not to take sick animals to veterinary hospitals*" [*Female, 32 years old, animal owner in Chohit veterinary clinic*]

"*…The market was near to my house then the veterinary health facility so sometimes I bought drugs in the market*" [*Male, illiterate, animal owner in Burbuaks veterinary clinic*]

"*… sometimes the drug wasn't available in health facility so I purchased the medication elsewhere (kiosks)"* [*Female, illiterate, animal owner in Enfiranze veterinary clinic*]

"*…I used human drugs on animals at one time, which was due to one holiday my cattle were very sick, and then brings it to the clinic but the clinic was closed. So, I was gone back and given human drugs because at that time didn't have animal drugs*" [*Male, illiterate, animal owner in Jenda veterinary clinic*

7. Discussions

The primary focus of the current study was to evaluate facility practices and animal owner perspectives on the use of antimicrobial drugs in food animals. The results from the quantitative and qualitative stages were combined in this part to thoroughly address the study objectives. In the present investigation, prescriptions from 20 veterinary clinics contained two or more medications in 42% of cases, an average of 1.5 drugs per prescription. This outcome is congruent with the previous study for an evaluation of animals' rational use research, which was 1.6 medicines per prescription (Etefa *et al.*, 2021). The current study's results were greater than the other two previous studies in Ethiopia, which were 1.23 (Beyene *et al.*, 2015) and 1.25 medications per prescription (Beyene *et al.*, 2016). According to WHO guidelines, there shouldn't be more than two drugs per prescription on average (<2) (WHO, 1993, Isah et al., 2004). All study results were less than the WHO standard; this indicated that polypharmacy wasn’t a significant problem for food animals in the current and other study areas conducted in Ethiopia.

Generic medicine prescriptions are used to simplify drug identification, facilitate information sharing, and improve inter-professional communication (Atif *et al.*, 2016). In the current study at twenty veterinary clinics, over all medicines were prescribed from EVDLs by generic name. It achieves the WHO recommendations (WHO, 1993, Isah *et al.*, 2004). This is an indicator of the quality of the prescription (Laychiluh, 2014). So, the study area had good prescribing practices in prescribing from EVDLs by generic name. In a previous study, 90.1% (Beyene *et al.*, 2015), 97.4% (Beyene *et al.*, 2016), and 100%

of drugs were prescribed in generic name (Etefa *et al.*, 2021). All those studies strengthen the present study.

In the study facility, all selected prescription papers had a minimum of one antibiotic and injections per prescription. Hence, from a total of 883 prescribed drugs, 68.7% were antibiotics and 97.8% were injections. These results were extremely higher than the WHO standard, which reported that antibiotics should be between 20-27 percent, and injections should be between 13-24 percent (WHO, 1993, Isah et al., 2004). Therefore, in this trial, the proportion of standard antibiotics and injections was roughly 1:3 and 1:4, respectively (WHO, 1993, Isah *et al.*, 2004). These showed that prescribed antibiotics and injections in the study area were greater than the standard and it is one irrational practice. These happened due to a lack of other drugs, the prescriber's belief about the effect of antibiotics, and due to lack of laboratory tests challenging to identify the exact disease. Because diagnosis without a laboratory test means, medication is prescribed without knowledge of the disease's exact bacterial, viral, or fungal etiology. Therefore, patients are not properly treated, which results in improper medication prescription (Ayukekbong *et al.*, 2017)

Pasteurellosis, GIT parasite, blackleg, and mastitis for bovine, ovine, and caprine animals were frequent illnesses in this study. More female animals were impacted, this may due to mastitis because it is the most prevalent disease that mainly affects female animals (Page and Gautier, 2012). All those unhealthy animals were diagnosed without laboratory tests. This result was almost similar to the study done in central Ethiopia, from all food animals that were admitted to the study area more than 97% of them were treated without

laboratory tests (Beyene et al., 2015, Beyene et al., 2016). Moreover, the other study in South Africa states that 91.2% of antibiotics are prescribed before taking laboratory tests (Gwangwava *et al.*, 2014). This may due to lack of laboratory material, and/or a lack of knowledgeable professionals (Brahma *et al.*, 2012). Also, if there are high-cost animal owners mayn't agree to pay (Gnanou, 1998).

To treat all infectious agents in food animals used antimicrobial drugs and the usage differs from place to place, on farms, and within species of animals (Sawant *et al.*, 2005). In this study, commonly used antimicrobial medicines were Oxytetracycline (43%), Penstrep (20.7%), and Potentiated sulfa (5.1%). Similarly, a study in New Zealand reported that those drugs are used to treat the main food-producing species (Briyne *et al.*, 2014). All those drugs were broad-spectrum but narrow-spectrum drugs weren't as frequently used. This may be a result of a lack of trust in the expert, a lack of alternative medications, or prescribers' misconceptions regarding antibiotics (WHO, 2012).

Of a total of twenty facilities, 40% of them had their treatment guidelines. Only 25% had both national EVDL and formularies and their treatment guidelines, while 35% did not. The WHO recommends that for effective health delivery should be used EDL, STGs, and formularies (WHO, 1993). Therefore EDL or formulary should be available at health facilities because those are used by the prescribers to prescribe and dispense medicine properly (Atif *et al.*, 2016).

During the study time on average, 60% of 15 key drugs were available in selected health facilities. From those, Oxy-tetracycline, Albendazole, and Ivermectin were found in all but none of them had Grisofulvin and Ketoconazole. About 80% of drugs were found at

Hawariaw-Pawlos and University of Gondar veterinary clinics. At Burbuaks, Jayira, Denzaz, and Bahiriginib veterinary clinics only 40% of drugs were obtained in each. Those results indicated that drugs are more accessible in urban than rural areas but anti-fungal drugs were not found in all selected clinics. This may be related to the cost of drugs and prescribing habits of the prescriber (prescribed antibiotics for fungal disease). The shortage of access to key drugs in stock is showed that the pharmacy and also the whole services aren't nice and this may be happened because of drugs use unsuccessfully and mismanagement of inventory systems (Ofori-Asenso and Agyeman, 2016). This may be hard for professionals to efficiently deliver health services (WHO, 2018).

In animal subjects, no studies to assess the status of veterinary health centers by facility indicator but accessible to human subjects. Different studies in Ethiopia stated that a copy of EDL is available in most studies area and prescribe drugs on that list (Dessalegn *et al.*, 2021). The maximum and minimum were 100% (Gebramariam and Ahmed, 2019), and 83%, respectively (Mamo and Alemu, 2020). In other countries, Nepal (Dahal *et al.*, 2012) and Pakistan (Atif *et al.*, 2016) was the maximum availability of EDL (100%) and the minimum was in Kenya (20%) (Nyabuti *et al.*, 2020). Moreover, the maximum key drug availability was 100% (Mariam *et al.*, 2015) but the minimum was 0% (Getahun *et al.*, 2020). This shows that EDL is poorly utilized in animals and key drugs were moderately available in animal health facilities.

To improve rationality in health sectors must be always available adequate amounts of essential drugs with skilled professionals. Because, vital drugs are necessarily for preventing and treating disease and one quality of healthcare is the availability of safe,

effective, and affordable drugs with required quality and quantity at all times (Acar, 1997). Skilled professionals are necessary for properly selecting, dispensing, and used rationally those essential drugs. Properly selecting drugs is useful in the cost, supply, prescribe, and consumers, which is used for more and less drug-accessible areas (FMHACA, 2012). During dispensing, they can be given unbiased, perfect, complete, accessible, and useable medicines. In addition, for better therapy of disease prescribing activity should be used harmless, highly effective, and small-cost drugs (Gyssens, 2001). Because it is a key issue for modern medicine and used to minimize resistance by using it properly (Pang *et al*., 1994). However, professionals that have less skill and knowledge may raise the probability of misuse and the spread of antimicrobial resistance (Okeke *et al.*, 1999). The solution to reducing resistance is to decrease the use of antimicrobials in animals (Chantziaras *et al.*, 2014) and search for new antibiotics (Todar, 2004).

In this study, on the assessment of animal owners' knowledge of antimicrobial usage, more than three out of every four are aware of its use in the prevention and treatment of bacterial infections (81.3%). But, 60.2% of the participant had misconceptions about the growth promoters or prophylactic drug reason for a problem, and 25.3% of them disagreed with drug use non-therapeutically may cause resistance. The previous study reported that 76.7% (Oh *et al*., 2011) and 43.4% of participants had awareness on the value of antibiotics in battling germs, plus 60% of the participant had misconceptions about non-therapeutic use of a drug (Nuangmek *et al.*, 2018). These results indicated most participants had awareness of the use of antimicrobials but not the health effects of non-therapeutic use. These may relate to the farmer that had limited awareness and lack of education about antibiotic use (Oluwasile *et al.*, 2014). Because of this, they may use

antibiotics as a growth promoter, which is one of the improper uses of a drug in agriculture (Larson, 2007). So, it may problems for animal well-being and financial crises (Acar, 1997). To avoid this should stop usages of antibiotic drugs as growth promoters in animals (Todar, 2004).

Veterinary drug usage and intake increased (Vanghel, 2012) and are mostly used arbitrarily in the treatment of animals (Jacela *et al.*, 2009). Hence, overdose, long-acting drugs (Beyene and Tesega, 2014) and the absence of a finishing drug withdrawal period may reason for drug residues to remain in food-animal (Annan-Prah *et al*., 2012). It is one reason for food contamination in the world (Rokka *et al*., 2005). According to a prior study conducted in Ethiopia, 66.1% of participants were aware of the withdrawal period of antibiotics (Seblewongel and Taddesa, 2018). However, the study in Thailand reported that 95.6% of participants adhered drug withdrawal period (Nuangmek *et al.*, 2018). Conversely study in Uganda indicated around partial of the participants weren't aware (Bashahun and Odoch, 2015). Similarly in the current study, only 49.5% of the participant had awareness of antimicrobial drugs that remain in meat, milk, and egg. Also, only 37.7% of them know about drug withdrawal periods must be adhered and only 21.2% of them always adhered. Additionally, other studies also reported animal owners were lack of practice during the withdrawal period (Addah *et al.*, 2009). Therefore, the report of another study indicated that of the total contributor, 86.7% gave milk for their calf, 12.8% sold the milk and 0.5% of them used milk for home consumption before adhered the drug withdrawal period (Seblewongel and Taddesa, 2018).

Some respondents agree with there is an association between antibiotic use in animals, increased resistance, and the reason for infection in humans (Geta and Kibret, 2021), and

the study in the United Kingdom showed that few of them agree (Habing *et al.*, 2016). However, Friedman *et al*. reported that most participants didn't agree with the antimicrobial used for animal lead resistance (Friedman *et al.*, 2007). In the current study, three-fourths of participants knew about the proper dose used to increase drug effectiveness (80.7%) but when drugs aren't used carefully resistance will occur (75.8%). In addition, almost half of the animal owners agree drug efficacy reduces when multi AMs drugs are used at the same time (62.0%) for a long time (59.3%). Ozturk *et al*. reported that 72% of participant recognizes inappropriate use lead to drug resistance (Ozturk *et al.*, 2019). Nuangmek *et al.* described that almost two-thirds of respondents agreed with the use of the same drug for a long time reduces efficacy and leads to antimicrobial resistance (Nuangmek *et al.*, 2018). Also, the drug's effectiveness could be affected by the use of below therapeutic doses, particularly if the drug give in feed for low doses over a prolonged time leading to resistance (Brahma *et al.*, 2012).

The previous study stated most of the time lacking medical guidance on antimicrobial use is common (Rather *et al.*, 2017). Because, information and views are transferred from one generation to another so animal owners acquired former experiences and can be simply got and used drugs without a prescription (Chauhan *et al.*, 2018). In addition, leftover medicines use again (Skliros *et al*., 2010), non-completed treatment (Spellberg *et al.*, 2013), unwanted drug use, and promote drug resistance (Albrich *et al.*, 2004). Because, during self-medication most of the time drugs are used irrationally (Jafari *et al*., 2015). However, good communication between the user and the professional is used to develop the habit of the user to complete the treatment (Sencan *et al.*, 2011).

In this study, 73.3% of the participant agree on AMs aren't given to animals before consulting a veterinarian but only 44% of them ask a veterinarian earlier for drug use. Also, 73.5% agree on follow veterinarian instructions for drug administration but only 49.0% of them follow their recommendation. These showed participants had awareness but weak in practice. Previous studies reported most animal owners ask a veterinarian earlier of drug use (Geta and Kibret, 2021). A participant in a recent study provides the following explanation of the reasons of ask the advice of a professional: "…*Because they were provided a brief explanation of the drug's advantages and disadvantages …"* "…*Because I think it's crucial to use a drug safely and effectively on animals" [Male, educated (have Degree) animal owner in University of Gondar veterinary clinic],* and "…*Because I am unfamiliar with how to administer medications to animals…"* [*Female, illiterate, animal owner in Maksegnt veterinary clinic*]

Whereas, Jones *et al*. reported that only 17% of participants favored consulting a professional earlier to start antimicrobial use (Jones *et al.*, 2015). This may be because of the absence of veterinary facilities, self-diagnosis, and simple to access antibiotics (Chauhan *et al.*, 2018). Hence, they acquired information from other farmers (Ozturk *et al.*, 2019) or ask recommendation from friends (Pınar *et al.*, 2013). Participants in the current study's explanation for not consulting professionals included: *"...Because I have the confidence in me and my friend's previous knowledge*" [*Male, uneducated, animal owner in Guarhea veterinary clinic*] and "…*I occasionally used my traditional knowledge to treat sick animals because I am well versed in certain diseases ...* [*Male, 59 years old, animal owner in Meskele-Kristos veterinary clinic*].

Approximately two-thirds of current study participants had good awareness on AMs are harmless when purchased in a legal place (73.9%). While, due to sociocultural differences, knowledge, beliefs, expectations, and attitudes of people toward antimicrobials (Davey *et al*., 2002) certain users borrow drugs when they were sick (Daban *et al.*, 2010). Also, some animal owners got drugs previously stored in their houses and others bought drugs in veterinary facilities but the greatest animal owners bought drugs from private pharmacies without a prescription (Geta and Kibret, 2021). Reason of participants doesn't purchase the drug in a veterinary facility: "…*Because the clinic was far from my residence …*" [*Female, 32 years old, animal owner in Chohit veterinary clinic*]; "…*The market was near to my house then the veterinary health facility…*" [*Male, illiterate, animal owner in Burbuaks veterinary clinic*], and "… *sometimes the drug wasn't available in health facility so I purchased the medication elsewhere (kiosks)"* [F*emale, illiterate, animal owner in Enfiranze veterinary clinic*]

Some contributors discontinue providing drugs when the animal shows signs of recovery (Al-Mustapha *et al.*, 2020). This may due to the belief of societies, lack of advice from professionals (Lazaratou *et al.*, 2006), and less awareness of the drug mechanism of action and side effects (Cushing and Metcalfe, 2007). In this study, 53.3% of animal owners never stop when animals feel better after the first day of treatment but only 38.8% never increase the dose & frequency of the drug even if animal health has not improved. Those results were similar to Ozturk et al. who reports 41% and 45% respectively (Ozturk *et al.*, 2019). However, Cattaneo *et al.*, described that 77% of participants finished the prescribed drug (Cattaneo *et al.*, 2009). The explanations of current study participants are as "…*I believe that keeping a medicine regimen up to date is vital for the*

future of animal's health" [*Female, animal owner in Robit veterinary clinic*] and "…*if my animal didn't show any signs of improvement…I brought the animal back to the veterinarian clinic. Because I believe that there may be other unresolved issues with animals as the root of this*" [*Male, animal owner in Jayira veterinary clinic*]

On the whole of the animal owner in this study, 50.0% of them never used multiple drugs to increase efficacy but only 38.0% of them never used the same drugs for a long time. Furthermore, 36.3% and 27.7% of them sometimes practice giving AMs without disease outbreaks and used AMs on food animals only for prevention purposes, respectively. Those may be due to the consideration of animal owners' low amount of drugs in feed or drink is important to disease protection (Mellon *et al.*, 2001). As a result, they give to the animal for a long time at a sub-therapeutic dose (Carlet *et al.*, 2012). This was one of the irrational uses of the drug. These are widespread issues (WHO, 2002, WHO, 2006) in both veterinary and human medicine (Catery *et al.*, 2003). This may cause severe health-associated problems (Castro-Sanchez *et al*., 2016). One and foremost problem was raised resistance in animals and transmission to humans (Cameron and McAllister, 2016) through direct contact or food (Duerden *et al.*, 2013). It is more aggravated when the drug is administered for a long time (Beyene and Tesega, 2014). This may cause for challenging to treat disease easily (WHO, 2011). Therefore, nowadays one and the main concern for public health is the use of antimicrobials for food animals (Webb *et al.*, 2017). So, proper use is necessary to encourage health (Ritika *et al*., 2013). Because it is used to prevent and treat disease that causes death in developing countries like Ethiopia (Bbosa *et al.*, 2014). And, aims are to raise the quality of medicine, maximize beneficial outcomes, and decrease adverse drug reactions (Laing *et al.*, 2001, DACA, 2002).

Kept drugs in various areas at home bought with a prescription or not, but sometimes that area didn't do well and may cause deformation of the drug (Sharif *et al.,* 2010). Findings from the previous study were 95.6% of participants were aware that drugs should be kept in a protected place (Nuangmek *et al.*, 2018). In the current study, 78.8% of this study participant was aware and 49.3% of them always and only 9% of them never do it. The reasons explained by a participant were "…*I always placed it in the right spot to prevent drug expiration*" [*Male, animal owner in Jangua veterinary clinic*]

Generally, in this study, 60.8%, 61.3%, and 41.3% of participants answered correctly the whole knowledge, attitude, and practice assessment questions, respectively. This showed that participants were good in knowledge and attitude but weak in practice. Those could be related to education, which would indicate that most of them (60.8%) lacked formal education because they tended to be from rural areas (90%). On the other hand, only 6.3% of participants possessed a Diploma and Degree. Therefore, this interferes with the knowledge label of animal owners and may reason for misapprehension of the whole information told by professionals. This causes drug use wrongly, drug resistance, and zoonotic infections (Eltayb *et al.*, 2012). Especially lack of knowledge on antibiotic use may contribute to the spreading of those problems (Oluwasile *et al.*, 2014). Education is a successful strategy to reduce this problem (Mainous *et al.*, 1998).

Men and animal owners between the ages of 15 and 25 provided the majority of correct responses. This showed that male and early working-age participants had more awareness than others. If they had better access to learning, it could be related to education. The previous study showed that knowledge had a significant relationship between the levels

of education, age (Nulty *et al*., 2012), and sex (Kim *et al.*, 2011). In the current study, there was a statistically significant association between knowledge, attitude, and practice of antimicrobial use and education ($p<0.05$). This means the KAP of less educated participants was lower than others ($p<0.05$). Therefore, a person that had a Diploma and Degree were giving the most correct response.

7.1. Limitation of the study

In this study there was some restriction but, it can't undermine this study's finding because all steps have been applied strictly to the assessment of facility practice and animal owner overview. This study covers all WHO core prescribing and facility indicators. But, the result is not expressed overall prescribing practice of government health facilities. Moreover, cases were diagnosed tentatively no laboratory test was done for all cases and only the case of bovine, ovine, and caprine was documented but no other food animal. Additionally, because of the difficulty to do a longitudinal study with our resources used cross-sectional surveys.

Some limitations were perceived from animal owners' perspectives. Firstly, the number of participants was small so may not reflect the real situation of KAP of the animal owners in Ethiopia as a whole. Secondly, the study doesn't include the prescriber view so the study result may not indicate the presence or absence of rational prescribing and dispensing. Also, the absence of previous studies and standards has created difficulty to make a comparison.

8. Conclusion and recommendation

The findings of this study showed that the best prescribing practice in all selected clinics was to prescribe antimicrobials by generic name from national veterinary drug list. Plus, the average number of drugs per prescription was under the WHO recommendations so polypharmacy wasn't found to be a problem. But the percentage of prescribed antibiotics and injections was very high in the WHO recommendations and they had a problem in diagnosing and treating food animals with a laboratory tests. In addition, only a few veterinary clinics found in urban areas had both national veterinary drug list and formularies and their treatment guidelines but most of them hadn't both. Plus, some of them lack essential drugs, especially anti-fungal drugs. All this result shows there was an irrational practice in a health facility.

Regards to antimicrobial use a large number of participants had information but they had gaps in understanding, practice, and lack of knowledge about in withdrawal period and non-therapeutically used drugs. This means they believe drugs didn't remain in the food-animal product and the nontherapeutic use of drugs hadn't a problem. Also, some of them practice using drugs before consulting professionals and didn't adhere to the withdrawal period. In addition, some animal owners always give the drug to their animals if sick or not, because they think it is used to promote animal growth. All those were because most participants in this study were illiterate. Therefore, regarding the use of antimicrobials in animals' educated participants had good KAP than others.

Based on the above conclusions the following recommendations are forwarded to promote the rational use of antimicrobial drugs:

- Should give WHO recommendations and training for veterinarians about rational use of drug for food animal.
- Promoting good diagnosis practices for the use of antimicrobials in food animals by performing standard laboratory examination and careful assessment of clinical parameters and concluding definitive diagnosis.
- Governmental healthcare institutions should give attention to improving the rational use of antimicrobial drugs by improving the availability of essential guidelines and key drugs in the stock.
- Ethiopian Veterinary Drug and Feed Administration and Control Authority (VDFACA) should strengthen its surveillance of monitoring veterinary drug distribution, purchasing, and use.
- Improve animal owner KAP on dispensed drugs for the animal by raising awareness about proper antimicrobial use and the harms of improper use.
- Another study is necessary to additional search for practices and attitudes to achieve better antimicrobial usage for an animal.

7. Reference

Acar, J. F. (1997). Consequences of bacterial resistance to antibiotics in medical practice. *Clin Infect Dis,* 24 Suppl 1**,** S17-8.

Addah, W., Baah, J., Tia, S. & Okine, E. (2009). Knowledge and practices of smallholder farmers and herdsmen in the use of acaricides and gastrointestinal anthelminthic in Ghana. *Livestock Research for Rural Development,* 21**,** 1-10.

Al-mustapha, A. I., Adetunji, V. O. & Heikinheimo, A. (2020). Risk perceptions of antibiotic usage and resistance: A cross-sectional survey of poultry farmers in Kwara State, Nigeria. *Antibiotics,* 9**,** 378.

Albrich, W. C., Monnet, D. L. & Harbarth, S. (2004). Antibiotic selection pressure and resistance in Streptococcus pneumoniae and Streptococcus pyogenes. *Emerging infectious diseases,* 10**,** 514.

Anderson, A. D., Nelson, J. M., Rossiter, S. & Angulo, F. J. (2003). Public health consequences of use of antimicrobial agents in food animals in the United States. *Microbial Drug Resistance,* 9**,** 373-379.

Annan-prah, A., Agbemafle, E., Asare, P. & Akorli, S. (2012). Antibiotic use, abuse and their public health implication: the contributory role of management flaws in the poultry industry in two agro-ecological zones in Ghana. J Vet Adv, 2(4), 199-208.

Anthony, F., Acar, J., Franklin, A., Gupta, R., Nicholls, T., Tamura, Y., Thompson, S., Threlfall, E., Vose, D. & Van vuuren, M. (2001). Antimicrobial resistance: responsible and prudent use of antimicrobial agents in veterinary medicine. *Revue Scientifique et Technique-Office International des Epizooties,* 20**,** 829-848.

Atif, M., Sarwar, M. R., Azeem, M., Naz, M., Amir, S. & Nazir, K. (2016). Assessment of core drug use indicators using WHO/INRUD methodology at primary healthcare centers in Bahawalpur, Pakistan. *BMC health services research,* 16**,** 1-9.

Ayukekbong, J. A., Ntemgwa, M. & Atabe, A. N. (2017). The threat of antimicrobial resistance in developing countries: causes and control strategies. *Antimicrobial Resistance & Infection Control,* 6**,** 1-8.

Barbosa, T. M., Serra, C. R., La Ragione, R. M., Woodward, M. J. & Henriques, A. O. (2005). Screening for bacillus isolates in the broiler gastrointestinal tract. *Appl Environ Microbiol,* 71**,** 968-78.

Barlow, J. (2011). Mastitis therapy and antimicrobial susceptibility: a multispecies review with a focus on antibiotic treatment of mastitis in dairy cattle. *J Mammary Gland Biol Neoplasia,* 16**,** 383-407.

Bashahun, D. & Odoch, T. (2015). Assessment of antibiotic usage in intensive poultry farms in Wakiso District, Uganda. *Livestock Research for Rural Development,* 27.

Bbosa, G. S., Mwebaza, N., Odda, J., Kyegombe, D. B. & Ntale, M. (2014). Antibiotics/antibacterial drug use, their marketing and promotion during the post-antibiotic golden age and their role in emergence of bacterial resistance.

Behnke, R. H. (2010). The contribution of livestock to the economies of IGAD member states study findings, application of the methodology in Ethiopia, and recommendations for further work. *IGAD LPI Working Paper 02–10*.

Belongia, E. A. & Schwartz, B. (1998). Strategies for promoting judicious use of antibiotics by doctors and patients. *Bmj,* 317**,** 668-671.

Berhe, K. (2013). Diagnosis and intervention plans for North Gonder zone, Amhara Region. *Livestock and Irrigation Value chains for Ethiopian Smallholders (LIVES) Report. Addis Ababa, Ethiopia: International Livestock Research Institute (ILRI)*.

Beyene, T., Assefa, S., Ayana, D., Jibat, T., Tadesse, F., Nigussie, D. & Beyi, A. F. (2016). Assessment of rational veterinary drugs uses in livestock at Adama district veterinary clinic, central Ethiopia. *J Veterinary Science Techno,* 7**,** 2.

Beyene, T., Endalamaw, D., Tolossa, Y. & Feyisa, A. (2015). Evaluation of rational use of veterinary drugs especially antimicrobials and anthelmintics in Bishoftu, Central Ethiopia. *BMC research notes,* 8**,** 1-8.

Beyene, T. & Tesega, B. (2014). Rational veterinary drug use: Its significance in public health. *Journal of Veterinary Medicine and Animal Health,* 6**,** 302-308.

Bhaskaram, P. (2002). Micronutrient malnutrition, infection, and immunity: an overview. *Nutrition reviews,* 60**,** S40-S45.

Bloom, B., Engelhart, M., Furst, E., Hill, W. & Krathwohl, D. (1956). 1956, Taxonomy of Educational Objectives: The Classification of Educational Goals, Handbook I: Cognitive Domain: New York, David McKay Co. Inc.

Brahma, D., Marak, M. & Wahlang, J. (2012). Rational use of drugs and irrational drug combinations. *The Internet Journal of Pharmacology,* 10**,** 1-5.

Briggs, P. & Blatt, B. (2009). *Ethiopia*, Bradt Travel Guides.

Briyne, N., Atkinson, J., Borriello, S. & Pokludová, L. (2014). Antibiotics used most commonly to treat animals in Europe. *Veterinary Record,* 175**,** 325-325.

Brooks, G. F., Carroll, K. C., Butel, J., Morse, S., Mietzner, T. & Jawetz, M. (2007). Adelberg's medical microbiology. *Sultan Qaboos Univ. Med. J,* 7**,** 273.

Burke, A., Smyth, E. & Fitzgerald, G. A. (2006). Analgesic-antipyretic agents; pharmacotherapy of gout. *Goodman & Gilman's the pharmacological basis of therapeutics,* 11**,** 671-715.

Cameron, A. & Mcallister, T. A. (2016). Antimicrobial usage and resistance in beef production. *Journal of Animal Science and Biotechnology,* 7**,** 1-22.

Canton, R., Horcajada, J. P., Oliver, A., Garbajosa, P. R. & Vila, J. (2013). Inappropriate use of antibiotics in hospitals: the complex relationship between antibiotic use and antimicrobial resistance. *Enfermedades infecciosas y microbiologia clinica,* 31**,** 3-11.

Carlet, J., Jarlier, V., Harbarth, S., Voss, A., Goossens, H. & Pittet, D. (2012). Participants of the 3rd World Healthcare-Associated Infections Forum. Ready for a world without antibiotics? The Pensières antibiotic resistance call to action. *Antimicrob Resist Infect Control,* 1**,** 11.

Castro-Sanchez, E., Moore, L. S., Husson, F. & Holmes, A. H. (2016). What are the factors driving antimicrobial resistance? Perspectives from a public event in London, England. *BMC infectious diseases,* 16**,** 1-5.

Catery, B., Laevens, H., Deverisa, L., Opsomer, G. & De Kruif, A. (2003). Antimicrobial resistance in milk and meat; Perceptions and realities. *J. Vet. Med,* 87**,** 1222-1228.

Cattaneo, A., Wilson, R., Doohan, D. & Lejeune, J. (2009). Bovine veterinarians' knowledge, beliefs, and practices regarding antibiotic resistance on Ohio dairy farms. *Journal of Dairy Science,* 92**,** 3494-3502.

CDC 2005. What is an antibiotic? In National Antimicrobial Resistance Monitoring System (NARMS). Department of Health and Human Services. Frequently asked questions about antibiotic resistance. Centers for Disease Control and Prevention, Atlanta, USA.

Chantziaras, I., Boyen, F., Callens, B. & Dewulf, J. (2014). Correlation between veterinary antimicrobial use and antimicrobial resistance in food-producing animals: a report on seven countries. *Journal of Antimicrobial Chemotherapy,* 69**,** 827-834.

Chauhan, A. S., George, M. S., Chatterjee, P., Lindahl, J., Grace, D. & Kakkar, M. (2018). The social biography of antibiotic use in smallholder dairy farms in India. *Antimicrobial Resistance & Infection Control,* 7**,** 1-13.

Chopra, I. & Roberts, M. (2001). Tetracycline antibiotics: mode of action, applications, molecular biology, and epidemiology of bacterial resistance. *Microbiology and molecular biology reviews,* 65**,** 232-260.

Cooper, J. A., Moriarty, F., Ryan, C., Smith, S. M., Bennett, K., Fahey, T., Wallace, E., CAHIr, c., Williams, D. & Teeling, M. (2016). Potentially inappropriate prescribing in two populations with different socio-economic profiles: a cross-sectional database study using the PROMPT criteria. *European journal of clinical pharmacology,* 72**,** 583-591.

Cosgrove, S. E., Sakoulas, G., Perencevich, E. N., Schwaber, M. J., Karchmer, A. W. & Carmeli, Y. (2003). Comparison of mortality associated with methicillin-resistant and methicillin-susceptible Staphylococcus aureus bacteremia: a meta-analysis. *Clinical infectious diseases,* 36**,** 53-59.

CSA. (2007). "The federal democratic republic of Ethiopia, central statistical investigatory," Statistical Report. Central Statistical Agency, Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia.

CSA. (2020). Agricultural Sample Survey, Report on Livestock and livestock characteristics. Central Statistical Agency, Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia.

Cushing, A. & Metcalfe, R. (2007). Optimizing medicines management: From compliance to concordance. *Therapeutics and clinical risk management,* 3**,** 1047.

Daban, F., Pasarín, M. I., Rodríguez-Sanz, M., García-Altés, A., Villalbí, J. R., Zara, C. & Borrell, C. (2010). Social determinants of prescribed and non-prescribed medicine use. *International journal for equity in health,* 9**,** 1-11.

DACA. (2002). List of veterinary drugs for Ethiopia. (1st ed.). Drug Administration and Control Authority of Ethiopia, Addis Ababa, Ethiopia.

DACA. (2006). Standard treatment guidelines for veterinary practice. (1stedn). Drug administration and control authority of Ethiopia. Addis Ababa, Ethiopia.

Dahal, P., Bhattarai, B., Adhikari, D., Shrestha, R., Baral, S. & Shrestha, N. (2012). Drug use pattern in primary health care facilities of Kaski District, Western Nepal. *Sunsari Technical College Journal,* 1**,** 1-8.

Davey, P., Pagliari, C. & Hayes, A. (2002). The patient's role in the spread and control of bacterial resistance to antibiotics. *Clinical Microbiology and Infection,* 8**,** 43-68.

Davies, J. & Davies, D. (2010). Origins and evolution of antibiotic resistance. *Microbiology and molecular biology reviews,* 74**,** 417-433.

Devries, K., Momchilova-Pankova, A., Snoek, G. & Wirtz, K. (1994). A novel acidic form of the phosphatidylinositol transfer protein is preferentially retained in permeabilized Swiss mouse 3T3 fibroblasts. *Experimental cell research,* 215**,** 109-113.

Donald, C. (2015). McDonald's global vision for antimicrobial stewardship in food animals.

Duerden, M., Avery, T. & Payne, R. (2013). Polypharmacy and medicines optimization. *Making it safe and sound. London: The King's Fund*.

Eltayb, A., Barakat, S., Marrone, G., Shaddad, S. & Stålsby Lundborg, C. (2012). Antibiotic use and resistance in animal farming: a quantitative and qualitative study on knowledge and practices among farmers in Khartoum, Sudan. *Zoonoses and public health,* 59**,** 330-338.

Enwere, O. O., Falade, C. O. & Salako, B. L. (2007). Drug prescribing pattern at the medical outpatient clinic of a tertiary hospital in southwestern Nigeria. *Pharmacoepidemiology and drug safety,* 16**,** 1244-1249.

Errington, A. J. & Tranter, R. (1991). *Getting out of Farming? Part two: The farmers*.

Etefa, M., Beyi, A. F., Ayana, D., Beyene, T. J. & Tufa, T. B. (2021). Research Article Veterinary Drug Prescribing Practices at Selected District Veterinary Clinics of Rift Valley Areas of Ethiopia. Veterinary Medicine International.

FAO. (2013). Statistical Yearbook. World Food and Agriculture Organization, UN Rome, Italy.

FAO/OIE/WHO. (2004). Second Joint FAO/ OIE/WHO Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance: Management options. Oslo, Norway.

FAOSTAT, F. (2016). live animal in 2016. URL: http://www. fao. org/faostat/en/-data/QC. *Food and agriculture organization of the United Nations (FAO)*.

Fingleton, J. (2004). Legislation for veterinary drugs control. *FAO Legal Papers (FAO) eng no. 38*.

Fischer, J. & Ganellin, C. R. (2010). Analog-based drug discovery. *Chemistry International--Newsmagazine for IUPAC,* 32**,** 12-15.

Fischer, W., Tritscher, A., Schilter, B. & Stadler, R. (2003). Contaminants resulting from agricultural and dairy practices. *Roginski H.: Encyclopedia of Dairy Sciences,* 1**,** 516-525.

Flynn, W. T. (2012). The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals. *Center for Veterinary Medicine (HFV-1), Food and Drug Administration. US Department of Health and Human Services*.

FMHACA, U. (2012). Manual for Medicines Good Dispensing Practice. *Addis Ababa: FMHACA***,** 1-76.

Franco, B. E., Altagracia Martínez, M., Sánchez Rodríguez, M. A. & Wertheimer, A. I. (2009). The determinants of the antibiotic resistance process. *Infection and drug resistance***,** 1-11.

Friedman, D., Kanwat, C., Headrick, M., Patterson, N., Neely, J. & Smith, L. (2007). Importance of prudent antibiotic use on dairy farms in South Carolina: a pilot project on farmers' knowledge, attitudes and practices. *Zoonoses and public health,* 54**,** 366-375.

Fritz, J. W. & Zuo, Y. (2007). Simultaneous determination of tetracycline, oxytetracycline, and 4-epi tetracycline in milk by high-performance liquid chromatography. *Food Chemistry,* 105**,** 1297-1301.

Gebramariam, E. & Ahmed, M. (2019). Evaluation of rational medicine use based on WHO core drug use indicators in public hospitals in West Shoa Zone, Oromia, Ethiopia. *Adv Pharmacoepidemiol Drug Saf,* 8**,** 2167.

Geta, K. & Kibret, M. (2021). Knowledge, attitudes and practices of animal farm owners/workers on antibiotic use and resistance in Amhara region, north western Ethiopia. *Scientific Reports,* 11**,** 1-13.

Getachew, E., Aragaw, S., Adissie, W. & Agalu, A. (2013). Antibiotic prescribing pattern in a referral hospital in Ethiopia. *African Journal of Pharmacy and Pharmacology,* 7**,** 2657-2661.

Getahun, K. A., Redia, A. S. & Aragaw, T. J. (2020). Evaluation of medicine-use pattern using World Health Organization's core drug-use indicators and completeness of prescription at University of Gondar Comprehensive Specialized Hospital, Gondar, Ethiopia: cross-sectional study. *Integrated pharmacy research & practice,* 9**,** 219.

Gnanou, J. C., . (1998). Antibiotic Resistance in Bacteria from Animal Origin-Analysis of national Monitoring Programs 1997. Fougeres, France: CNEVA.

Goossens, H., Ferech, M., Vander Stichele, R., Elseviers, M. & Group, E. P. (2005). Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. *The Lancet,* 365**,** 579-587.

Grace, D., Mutua, F., Ochungo, P., Kruska, R., Jones, K., Brierley, L., Lapar, L., Said, M., Herrero, M. & Phuc, P. (2012). Mapping of poverty and likely zoonoses hotspots. Zoonoses Project 4. Report to the UK Department for International Development. *International Livestock Research Institute, Nairobi, Kenya*.

Graham, J. P., Boland, J. J. & Silbergeld, E. (2007). Growth promoting antibiotics in food animal production: an economic analysis. *Public health reports,* 122**,** 79-87.

Groenewald, J. (1987). The producer as decision-maker. *Agrekon,* 26**,** 43-46.

Guardabassi, L. & Courvalin, P. (2005). Modes of antimicrobial action and mechanisms of bacterial resistance. *Antimicrobial resistance in bacteria of animal origin***,** 1-18.

Gwangwava, E., Manuere, F., Kudakwashe, G., Tough, C. & Rangarirai, F. (2014). An assessment of risk management practices in SMEs in Zimbabwe: A review and synthesis. *IOSR Journal of Humanities and Social Science,* 19**,** 06-14.

Gyssens, I. C. (2001). Quality measures of antimicrobial drug use. *International journal of antimicrobial agents,* 17**,** 9-19.

Habing, G., Djordjevic, C., Schuenemann, G. M. & Lakritz, J. (2016). Understanding antimicrobial stewardship: Disease severity treatment thresholds and antimicrobial alternatives among organic and conventional calf producers. *Preventive veterinary medicine,* 130**,** 77-85.

Hillerton, J., Irvine, C., Bryan, M., Scott, D. & Merchant, S. (2017). Use of antimicrobials for animals in New Zealand, and in comparison with other countries. *New Zealand veterinary journal,* 65**,** 71-77.

Humphrey, T. (2000). Public-health aspects of Salmonella infection. *Salmonella in domestic animals,* 1**,** 245-263.

Humphreys, H., Dillane, T., O'connell, B. & Luke, L. (2006). Survey of recent medical graduates' knowledge and understanding of the treatment and prevention of infection. *Irish medical journal,* 99**,** 58-59.

Iannotti, L. & Lesorogol, C. (2014). Animal milk sustains micronutrient nutrition and child anthropometry among pastoralists in Samburu, Kenya. *American Journal of Physical Anthropology,* 155**,** 66-76.

Ibia, E., Sheridan, M. & Schwartz, R. (2005). Knowledge of the principles of judicious antibiotic use for upper respiratory infections: a survey of senior medical students. *Southern medical journal,* 98**,** 889-896.

Isah, A., Ross-Degnan, D., Quick, J., Laing, R. & Mabadeje, A. (2004). The development of standard values for the WHO drug use prescribing indicators. International conference on improving use of medicines (ICIUM). INRUD—Nigeria1, Support Group 2; DAPWHO3. Nigeria.: Nigeria.

Jacela, J. Y., Derouchey, J. M., Tokach, M. D., Goodband, R. D., Nelssen, J. L., Renter, D. G. & Dritz, S. S. (2009). Feed additives for swine: Fact sheets–acidifiers and antibiotics. *Journal of Swine Health and Production,* 17**,** 270-275.

Jafari, F., Khatony, A. & Rahmani, E. (2015). Prevalence of self-medication among the elderly in Kermanshah-Iran. *Global journal of health science,* 7**,** 360.

Jha, D. N. (2000). *The feudal order: state, society, and ideology in early medieval India*, Manohar Publishers and Distributors.

Jones, P., Marier, E., Tranter, R., Wu, G., Watson, E. & Teale, C. (2015). Factors affecting dairy farmers' attitudes towards antimicrobial medicine usage in cattle in England and Wales. *Preventive veterinary medicine,* 121**,** 30-40.

Kim, S. S., Moon, S. & Kim, E. J. (2011). Public knowledge and attitudes regarding antibiotic use in South Korea. *Journal of Korean Academy of Nursing,* 41**,** 742-749.

Laing, R., Hogerzeil, H. & Ross-Degnan, D. (2001). Ten recommendations to improve use of medicines in developing countries. *Health policy and planning,* 16**,** 13-20.

Larson, E. (2007). Community factors in the development of antibiotic resistance. *Annu. Rev. Public Health,* 28**,** 435-447.

Laychiluh, B. (2014). Assessment of drug prescription practice using WHO prescribing indicators in Felege Hiwot Referral Hospital (FHRH) outpatient department, North, Ethiopia. *International Journal of Pharmaceutics,* 4**,** 89-94.

Lazaratou, H., Anagnostopoulos, D. C., Vlassopoulos, M., Tzavara, C. & Zelios, G. (2006). Treatment compliance and early termination of therapy: A comparative study. *Psychotherapy and psychosomatics,* 75**,** 113-121.

Levy, S. B. & Marshall, B. (2004). Antibacterial resistance worldwide: causes, challenges and responses. *Nature medicine,* 10**,** S122-S129.

Mableson, H. E., Okello, A., Picozzi, K. & Welburn, S. C. (2014). Neglected zoonotic diseases—the long and winding road to advocacy. *PLoS neglected tropical diseases,* 8**,** e2800.

Mackintosh, D. (2015). Antibiotics and dry cow therapy: what's the problem?

Mainous, A., Zoorob, R., Oler, M. & Haynes, D. (1998). Patient Knowledge of Upper Respiratory Infections: Implications for Antibiotic Expectations and Unnecessary Utilization. *Infectious Diseases in Clinical Practice,* 7**,** 327.

Mamo, D. B. & Alemu, B. K. (2020). Rational drug-use evaluation based on World Health Organization core drug-use indicators in a tertiary referral hospital, Northeast Ethiopia: a cross-sectional Study. *Drug, Healthcare and Patient Safety,* 12**,** 15.

Mao, W., Vu, H., Xie, Z., Chen, W. & Tang, S. (2015). Systematic review on irrational use of medicines in China and Vietnam. *PloS one,* 10**,** e0117710.

Mariam, A. H., Raghavendra, Y. & Bobasa, E. M. (2015). Evaluating rational drug use with the help of World Health Organization's core indicators in Bule Hora Hospital, Southern Ethiopia. *encounters,* 7**,** 11.

Matous, P., Todo, Y. & Mojo, D. (2013). Roles of extension and ethno-religious networks in acceptance of resource-conserving agriculture among Ethiopian farmers. *International Journal of Agricultural Sustainability,* 11**,** 301-316.

Mccorkle, C. M. & Mathias, M., E. (1992). Ethnoveterinary medicine in Africa. *Africa,* 62**,** 59-93.

Medical Dictionary (2011).

Medina, M.-J., Legido-Quigley, H. & Hsu, L. Y. (2020). Antimicrobial resistance in one health. *Global Health Security.* Springer.

Mellon, M., Benbrook, C. & Benbrook, K. (2001). Hogging it: Estimates of antimicrobial abuse in livestock. Union of Concerned Scientists, Cambridge, MA. *Hogging it: Estimates of antimicrobial abuse in livestock. Union of Concerned Scientists, Cambridge, MA.*

Metaferia, F., Cherenet, T. G., Abnet, F., Tesfay, A., Abdi, J. & Gulilat, W. (2011). A review to improve estimation of livestock contribution to the national GDP.

Mitchell, J., Griffiths, M., Mcewen, S., Mcnab, W. & Yee, A. (1998). Antimicrobial drug residues in milk and meat: causes, concerns, prevalence, regulations, tests, and test performance. *Journal of food protection,* 61**,** 742-756.

Moran, J. (2015). Managing cow lactation cycles. *The Cattle Site*.

Moyane, J., JIdeani, A. & Aiyegoro, O. (2013). Antibiotics usage in food-producing animals in South Africa and impact on human: Antibiotic resistance. *African Journal of Microbiology Research,* 7**,** 2990-2997.

Nepal, G. & Bhatta, S. (2018). Self-medication with antibiotics in WHO Southeast Asian Region: a systematic review. *Cureus,* 10.

Nuangmek, A., Rojanasthien, S., Patchanee, P., Yano, T., YamsakuL, P., Chotinun, S. & Tadee, P. (2018). Knowledge, attitudes, and practices toward antimicrobial usage: a cross-sectional study of layer and pig farm owners/managers in Chiang Mai, Lamphun, and Chonburi provinces, Thailand, May 2014 to February 2016. *Korean Journal of Veterinary Research,* 58**,** 17-25.

Nulty, C. A., Cookson, B. D. & Lewis, M. A. (2012). Education of healthcare professionals and the public. *Journal of antimicrobial chemotherapy,* 67**,** i11-i18.
Nyabuti, A. O., Okalebo, F. A. & Guantai, E. M. (2020). Examination of WHO/INRUD core drug use indicators at public primary healthcare centers in Kisii County, Kenya. *Advances in Pharmacological and Pharmaceutical Sciences,* 2020.
Ofori-Asenso, R. & Agyeman, A. A. (2016). Irrational use of medicines—a summary of key concepts. *Pharmacy,* 4**,** 35.
Oh, A. L., Hassali, M. A., Al-Haddad, M. S., Sulaiman, S. A. S., Shafie, A. A. & Awaisu, A. (2011). Public knowledge and attitudes towards antibiotic usage: a cross-sectional study among the general public in the state of Penang, Malaysia. *The Journal of Infection in Developing Countries,* 5**,** 338-347.
Okeke, I. N., Lamikanra, A. & Edelman, R. (1999). Socioeconomic and behavioral factors leading to acquired bacterial resistance to antibiotics in developing countries. *Emerging infectious diseases,* 5**,** 18.
Oluwasile, B., Agbaje, M., Ojo, O. & Dipeolu, M. (2014). Antibiotic usage pattern in selected poultry farms in Ogun state. *Sokoto Journal of Veterinary Sciences,* 12**,** 45-50.
Ozturk, Y., Celik, S., Sahin, E., Acik, M. N. & Cetinkaya, B. (2019). Assessment of farmers' knowledge, attitudes, and practices on antibiotics and antimicrobial resistance. *Animals,* 9**,** 653.
Page, S. W. & Gautier, P. (2012). Use of antimicrobial agents in livestock. *Rev Sci Tech,* 31**,** 145-88.
Paladino, J. A., Sunderlin, J. L., Price, C. S. & Schentag, J. J. (2002). Economic consequences of antimicrobial resistance. *Surgical infections,* 3**,** 259-267.
Panda, A., Pradhan, S., Mohapatra, G. & Mohapatra, J. (2016). Drug-related problems associated with self-medication and medication guided by prescription: A pharmacy-based survey. *Indian journal of pharmacology,* 48**,** 515.
Pang, Y., Brown, B., Steingrube, V., Wallace JR, R. & Roberts, M. (1994). Tetracycline resistance determinants in Mycobacterium and Streptomyces species. *Antimicrobial Agents and Chemotherapy,* 38**,** 1408-1412.
Partha, P. & Nagesh, S. (2002). Prescribing patterns in medical outpatients. *International journal of clinical practice,* 56**,** 549-551.
Paulsen, I. (1996). Carbon metabolism and its regulation in Streptomyces and other high GC Gram-positive bacteria. *Research in microbiology,* 147**,** 535-541.
Pechere, J.-C., Hughes, D., Kardas, P. & Cornaglia, G. (2007). Non-compliance with antibiotic therapy for acute community infections: a global survey. *International journal of antimicrobial agents,* 29**,** 245-253.
Perry, B. & Grace, D. (2009). The impacts of livestock diseases and their control on growth and development processes that are pro-poor. *Philosophical Transactions of the Royal Society B: Biological Sciences,* 364**,** 2643-2655.
Pinar, N., Karataş, Y., Bozdemir, N. & Ünal, İ. (2013). Medicine use behaviors of people in the city of Adana, Turkey. *TAF Prev Med Bull,* 12**,** 639-650.
Pollott, G. & Wilson, R. T. (2009). Sheep and goats for diverse products and profits. *FAO Diversification Booklet*.
Raloff, J. (2003). Food for thought: Global food trends. *Science news online,* 5**,** 2003.

Rather, I. A., Kim, B.C., Bajpai, V. K. & Park, Y.H. (2017). Self-medication and antibiotic resistance: Crisis, current challenges, and prevention. *Saudi journal of biological sciences,* 24**,** 808-812.

Ritika, R., Kondr, B. & Ghongane, B. (2013). Drug utilization research; need of the hour. *International Journal of Pharma and Bioscience,* 4**,** 170-178.

Rokka, M., Eerola, S., Perttila, U., Rossow, L., Venäläinen, E., Valkonen, E., Valaja, J. & Peltonen, K. (2005). The residue levels of narasin in eggs of laying hens fed with unmedicated and medicated feed. *Molecular Nutrition & Food Research,* 49**,** 38-42.

Ruckebusch, Y. (1988). Motility of the gastro intestinal tract. In 'The ruminant animal; digestive physiology and nutrition'.(Ed. DC Church) pp. 48–53. Prentice Hall: New Jersey.

Russell, A. D. (2004). Types of antibiotics and synthetic antimicrobial agents. *Hugo and Russell's Pharmaceutical Microbiology***,** 152-186.

Sanders, P. (2007). Veterinary drug residue control in the European Union. *Tehnologija mesa,* 48**,** 59.

Sawant, A., Sordillo, L. & Jayarao, B. (2005). A survey on antibiotic usage in dairy herds in Pennsylvania. *Journal of dairy science,* 88**,** 2991-2999.

Seblewongel, A. M. & Taddesa, B. A. (2018). Study on veterinary antibiotic drug handling and utilization in and around Holeta. *Journal of Veterinary Medicine and Animal Health,* 10**,** 55-59.

Sencan, N. M., Wertheimer, A. & Levine, C. B. (2011). What determines the duration of patient medication compliance in patients with chronic disease: are we looking in the wrong place? *Southern Med Review,* 4**,** 97.

Sharif, S., Al-Shaqra, M., Hajjar, H., Shamout, A. & Wess, L. (2008). Patterns of drug prescribing in a hospital in Dubai, United Arab Emirates. *Libyan Journal of Medicine,* 3**,** 10-12.

Sharif, S. I., Abduelkarem, A. R., Bustami, H. A., Haddad, L. I. & Khalil, D. S. (2010). Trends of home drug storage and use in different regions across the northern United Arab Emirates. *Medical Principles and Practice,* 19**,** 355-358.

Shivhare, S., Kunjwani, H., Manikrao, A. & Bondre, A. (2010). Drugs hazards and rational use of drugs: a review. *J Chem Pharm Res,* 2**,** 106-12.

Skliros, E., Merkouris, P., Papazafiropoulou, A., Gikas, A., Matzouranis, G., Papafragos, C., Tsakanikas, I., Zarbala, I., Vasibosis, A. & Stamataki, P. (2010). Self-medication with antibiotics in rural population in Greece: a cross-sectional multicenter study. *BMC family practice,* 11**,** 1-3.

Solomon, A., Workalemahu, A., Jabbar, M., Ahmed, M. & Hurissa, B. (2003). Socioeconomics and policy research working paper 52. *Kenya, ilri (international livestock research institute), Nairobi, livestock marketing in Ethiopia: A review of structure, performance and development initiatives*.

Soulsby, E. J. (2005). Resistance to antimicrobials in humans and animals. Bmj, 331(7527), 1219-1220.

Spellberg, B., Bartlett, J. G. & Gilbert, D. N. (2013). The future of antibiotics and resistance. *New England Journal of Medicine,* 368**,** 299-302.

Storey, A. A., Athens, J. S., Bryant, D., Carson, M., Emery, K., Defrance, S., HIGHAM, C., Huynen, L., Intoh, M. & Jones, S. (2012). Investigating the global dispersal of chickens in prehistory using ancient mitochondrial DNA signatures. *PloS one*, 7**,** e39171.

SwanepoeL, F., Stroebel, A. & Moyo, S. (2010). The role of livestock in developing communities: Enhancing multifunctionality, UJ Press.

Sweetman, S. C. (2005). Dose adjustment in renal impairment: response from Martindale: the Complete Drug Reference. Bmj, 331(7511), 292-293.

Thompson, J. (2022). A guide to abductive thematic analysis. *The Qualitative Report*, 27**,** 1410-1421.

Todar, K. G. (2004). *Todar's online textbook of bacteriology*, Kenneth Todar University of Wisconsin-Madison Department of Bacteriology.

USDA (2014). Livestock and poultry, world market and trade. The Poultry Site, April 30, 2013. Archived from the original on February 27, 2014.

Vance, M. A. & Millington, W. R. (1986). Principles of irrational drug therapy. *International Journal of Health Services,* 16**,** 355-362.

Vanghel, M. (2012). Effects of the antibiotic Tetracycline: sublethal nematode toxicity tests. Faculty of Science Department of Animal Ecology University of Bielefeld.

VDFACA (2016). Rational use of veterinary drugs and vaccines. Training manual. Veterinary Drug and Animal Feed Administration and Control Authority (VDFACA), Collaboration with University of Gondar, Faculty of Veterinary Medicine, Addis Ababa, Ethiopia.

Walsh, C. (2003). *Antibiotics: actions, origins, resistance*, American Society for Microbiology (ASM).

Webb, H. E., Angulo, F. J., Granier, S. A., Scott, H. M. & Loneragan, G. H. (2017). Illustrative examples of probable transfer of resistance determinants from food animals to humans: Streptothricins, glycopeptides, and colistin. *F1000Research*, 6.

Wegener, H. C. (2003). Antibiotics in animal feed and their role in resistance development. *Current opinion in microbiology*, 6**,** 439-445.

White, T. J., Arakelian, A. & Rho, J. P. (1999). Counting the costs of drug-related adverse events. *Pharmacoeconomics,* 15**,** 445-458.

WHO. (1993). How to investigate drug use in health facilities: selected drug use indicators. World Health Organization.

WHO. (1998). Use of quinolones in food animals and potential impact on human health: report and proceedings of a WHO meeting, Geneva, Switzerland, 2-5 June 1998. World Health Organization.

WHO. (2001). Monitoring antimicrobial usage in food animals for the protection of human health: Report of a WHO consultation. *Oslo, Norway, September***,** 10-13.

WHO. (2002). Promoting rational use of medicines: core components. World Health Organization.

WHO. (2006). Using indicators to measure country pharmaceutical situations: fact book on WHO level I and level II monitoring indicators. World Health Organization.

WHO. (2007). Critically important antimicrobials for human medicine: categorization for the development of risk management strategies to contain antimicrobial resistance

due to non-human antimicrobial use: report of the second WHO Expert Meeting, Copenhagen, 29-31 May 2007.
WHO. (2011). World health day 2011: policy briefs. *World Health Organization, Geneva, Switzerland. http://www. who. int/world-health-day/2011/policybriefs/en/index. html*.
WHO. (2012). Medicines: rational use of medicines. Fact sheet N 338. 2010.
WHO. (2013). *Transforming and scaling up health professionals' education and training: World Health Organization guidelines 2013*, World Health Organization.
WHO. (2015). *The selection and use of essential medicines: report of the WHO Expert Committee, 2015 (including the 19th WHO Model List of Essential Medicines and the 5th WHO Model List of Essential Medicines for Children)*, World Health Organization.
WHO. (2017). WHO guidelines on use of medically important antimicrobials in food-producing animals: web annex A: evidence base. World Health Organization.
WHO. (2018). Antimicrobial resistance and primary health care. World Health Organization.
WHO. (2019). World Health Organization model list of essential medicines: 21st list 2019. World Health Organization.
Willock, J., Deary, I. J., Mcgregor, M. M., Sutherland, A., Edwards-Jones, G., Morgan, O., Dent, B., Grieve, R., Gibson, G. & Austin, E. (1999). Farmers' attitudes, objectives, behaviors, and personality traits: The Edinburgh study of decision making on farms. *Journal of Vocational Behavior,* 54**,** 5-36.
WMA. (2013). World Weather Information Service. *Retrieved May,* 30.
Zaffiri, L., Gardner, J. & Toledo-Pereyra, L. H. (2012). History of antibiotics. From salvarsan to cephalosporins. *Journal of Investigative Surgery,* 25**,** 67-77.

Annexes

Annex 1: data collection tool for prescribing

Prescribing indicator form of WHO

Location: _____ Facility name: _____

Investigator: _____ date: _____

Sequence	Date of Rx	Animal	Sex (M/F)	Diagnosis (Dx)	List of Drugs	# drugs	# generics	Antibiotics(0/1)	Injection (0/1)	# on EVDL	Drug Cat. (Narrow= N Broad= B)
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

24											
25											
26											
27											
28											
29											
30											
Total							% of total drugs	% of total case	% of total case	% of total drugs	
Average											
Percentage											

Exclusion; medical devices and other non-drug items

*** 0 = No 1 = Yes**

WHO prescribing indicator and calculation

1. The average number of drugs per prescription. It calculates by dividing the total amount of drug prescribed by the amount of encounters surveyed. It is used to measure the degree of polypharmacy
2. Percentage of drugs prescribed by generic name. It was calculated by dividing the amount of drugs prescribed by generic name by the total amount of drugs prescribed, multiplied by 100. It is used to measure the tendency of prescribing by generic name;
3. Percentage of antibiotics that prescribe.
4. Percentage of injections that prescribe. It was calculated by dividing the amount of patient encounters in which a drug was prescribed by the total amount of encounters surveyed, multiplied by 100 to measure the overall use of commonly overused (irrationally prescribed) and costly forms of drug therapy;
5. The percentage of drugs prescribed from the national veterinary drug list of Ethiopia (EVDL) was calculated by dividing the number of products prescribed which are in the veterinary drug list by the total number of drugs prescribed, multiplied by 100 to measure the degree to which the practices conform to a national drug policy as indicated in the EVDL of Ethiopia (WHO, 1993; DACA, 2002).

Annex 2: data collection tool for facility indicator
Essential drug list assessment checklist

Location: _____ Facility name:_____

Investigator: _____date**:**_____

Model list of Key drugs for testing drug availability

Disease	A key drug in stock to treat an important condition	Classification	In stock
Mastitis (Reproductive disease)	Dihydrostreptomycin Sulphate + Procaine Penicillin G (Penstrep)	Anti-bacterial	
	Sulphadimidine + Trimethoprim (Potentiated Sulpha)		
	Procaine Penicillin G		
	Oxytereracylin		
CBPP/CCPP (Respiratory disease)	Tylosine		
Salmonellosis	Sulphadiazine + Trimethoprim		
Coccidosis	Amprolium Hydrochloride	Anti-protozoals (anti-coccidial)	
Trypanosomiasis	Diminazene Aceturate		
Warm infestation (GIT parasite)	Ivermectin	Anti- helmet	
	Albendazole		
Fashiolosis (Liver parasite)	Triclabendazole		
Dermatophytosis	Ketoconazole	Anti-fungal	
	Grisofulvin		
Tetanus (Central nervous system)	Xylazine		
Vitamin deficiency	Multi-vitamin		
% in stock this facility			

Note: 0 = No; 1 = Yes; CBPP = Contagious bovine ploro pneumonia. CCPP = Contagious caprine ploro pneumonia.
Reference: (DACA, 2002; VDFACA, 2019)

Annex 3: Participant consent form

Informed Consent Form
Addis Ababa University, School of pharmacy, department of pharmaceutics and social pharmacy, pharmaco-epidemiology and social pharmacy unit
Study Title: assess animal owners' perspective and facility practices on antimicrobial medicines use in food animals in the context of selected government veterinary clinics in Gondar town and its surrounding
Introduction and study objective
Hello, my name is Atsede Getaneh; I am contacting you to do my research. I collected data on antimicrobial use on food animals by assessing animal owner perspectives and facility practices. The data is important to know antimicrobial drug use on food animals in Gondar and its surrounding. Your responses will be strictly anonymous, meaning that your name or any personalized information will not be used or appear in any documents, communications, or analyses related to these data. Participation is strictly voluntary, and you do not have to answer all questions you do not wish to. You can withdraw consent at any time. Your responses will be integrated with others persons included in the study on Gondar and its surroundings to ensure the use of antimicrobials for food animals are rational or irrational. There is no guarantee of immediate benefit from your participation, yet, the results will help Your self, the veterinary drug and food administration, and control authority (VDFACA), and regional agriculture organizations to prevent and minimize the irrational use of antimicrobials in Gondar town and surrounding. To participate you are requested to: 1) collaborate with my data collectors to respond to questions linked to the study 2) authorize the use of these data while maintaining anonymity
Confidentiality
The interviewer will maintain complete confidentiality during the interview. The other interviewers or reviewers of the report will NOT be told your name or any other personally identifiable information.
Risks

Although the interviewer will never, under any circumstances, disclose your name or personal details about you being contacted to anyone. If users of the data guess (based on your location) or if you choose to disclose your identity to anyone, there may be a risk that your identity is revealed and linked to the results of the assessment.

Benefits

The benefit of your participation in this exercise is that the data arising from this assessment will be used in different ways by Gondar and surrounding animal owners by improving the knowledge of the importance of proper use of antimicrobials for food animals. And also used to improve the activity of government veterinary clinics in Gondar town and its surroundings.

Who to contact

If you decide to participate in this exercise and you have additional doubts or questions, you can communicate with the investigator and advisor.

Investigator: Atsede Getaneh; advisor: dr. Eskinder Eshetu

phone: 0937384034 email: eskeshet@gmail.com

Email: atsedegetaneh@gmail.com

Verbal consent and agreement

If you would like to participate, please confirm that you understood everything I have told you about this exercise. Do you have any questions? (Let the participant ask to have any questions).

Do you agree to allow us to start the anonymous partner tracing process? (Staff to fill out the part below and sign and give the participant a copy)

Agree to participate	
Does Not agree to participate	

I understand the study aims and objectives and have decided to allow the partner tracing process to go forward.

Name:	Day/Month/Year
Signature:	___/_____/_____

Person Obt**a**ining Consent:

Name:	Day/Month/Year
Signature:	___/_____/_____

Thank you for your participation in the study

Annex 4: Data Collection Tool for The Quantitative Part of the Study (KAP)

Interview: animal owners' perspective and facility practice on antimicrobial medicines use in food animals in the context of selected government veterinary clinics in Gondar town and its surrounding

I. Background Information on Informant

Interviewer_____ Date of Interview_____

Time Started _____ Time Finished _____

II: Socio-demographic information

"Encircle the right answer"

Background information	Answers
1. Gender	□1 Male □2 Female
2. Age	□1 15- 24 □2. 25 - 54 □3. 55-64 □4. >65Years
3. Education	□1 No formal education □2 First cycle primary education (1-4 Grade) □3 Second cycle primary education (5-8Grade) □4 High school (9-10 Grade) □5 High school/preparatory (11-12 Grade) □6 Technical and vocational training /college diploma □7 Bachelor's degree □8 MA/MSc and above
4. Habitation	□1 Urban (Gondar town) □2 Rural (surrounding Gondar)

III. Animal owner knowledge assessment questions

Sec.	A question to assess knowledge label on antimicrobial usage	Answer
1	Do you know antimicrobial drugs are used for bacterial treatment and control	
2	Do you know interaction among multi-antimicrobial drugs used at the same time can reduce the efficacy of other antimicrobial drugs	

	Do you know antimicrobial drugs are the same as a drug for the relief of pain	
3	Do you know antimicrobial drugs should be stored in a secure place and following the manufacturer's recommendation	
4	Do you know antimicrobial drug residues inside meat, milk, and egg	
5	Do you know drug withdrawal periods should be adhered to as per the prescription to avoid drug residues in meat, milk, and egg	
Assessment questions for knowledge label about an antimicrobial using consequence		
6	Do you know drug resistance will occur when antimicrobials are not used prudently (decrease or increase the dose of the drug)	
7	Do you know the non-therapeutic use of antimicrobial drugs, e.g., as a growth promoter or prophylactic can lead to antimicrobial resistance	
8	Do you know rational use of antimicrobial drugs including using the proper dosage can lead to increase drug effectiveness	
9	Do you know the use of the same antimicrobial drugs to food animals for long periods is reducing the efficacy of drugs	
Assessment questions about Knowledge of Acts and regulations to control antimicrobial usage		
10	Do you know Ethiopia has laws and regulations controlling drug use	
11	Do you know antimicrobial drugs must be approved by or registered with the competent authority	
12	Do you know sale and distribution of antimicrobial drugs shall only be done by persons permitted to do so by law	
13	Do you know veterinarians are responsible for drug prescriptions	

Note: 0 = no and not sure; 1 = yes

- Only yes answer represents the corrected responses**.**

IV. Assessment questions for animal owner attitude on antimicrobial use

Set this "X" symbol for the answer

Seq.	Questions	S.A.	A.	N.	D.A.	S.D.A.
1	Are you agree, antimicrobial usage for protection against diseases on food animal is may have a problem					
2	Are you agree, when animals get sick, don't give antimicrobials before consulting a veterinarian					
3	Are you agree, the use of antimicrobial drugs for non-therapeutic reasons (as a growth promoter, prophylactic) can lead to antimicrobial resistance					
4	Are you agree, the drug administration should be followed a veterinarian's instructions					
5	Are you agree, purchasing antimicrobial drugs from a drug company or cooperative with a legal permit is safe					
6	Are you agree, the inappropriate use of antimicrobial drugs can cause antimicrobial resistance					
7	Are you agree, strong enforcement of laws and regulations governing the rational use of antimicrobial drugs can lead to reduced antimicrobial resistance					
8	Are you agree, the cost of drugs isn't the most important reason for choosing an antimicrobial drug for animals					

Note: Agree includes both strongly agree and agree responses. The correct answer was agreed.

V. Animal owner practice assessment questions

Set this "X" symbol for the answer

Sec.	Questions	Alw.	Usu.	Som.	Nev.
1	Do you think always Veterinarians are responsible for drugs prescriptions				
2	Do you believe the duration of antimicrobial drug administration follows the drug recommendations and the advice of the consulting veterinarian				
3	You are to adhere to specified drug withdrawal periods before sending animals to the slaughterhouse				
4	Do your antimicrobial drugs are stored in the proper location on the house				
5	Are You consulting a veterinarian regarding the decision to use antimicrobial drugs on animals*				
6	Is prevention the only purpose of antimicrobial use on animals*				
7	Are you use antimicrobial drugs in the absence of a disease outbreak*				
8	Are you use multiple antimicrobial drugs at the same time to increase antimicrobial efficacy*				
9	Are you use the same antimicrobial drugs for long periods on animals*				
10	Do you increase the dose of antibiotics and frequency of admirations as long as the animal does not show any signs of recovery*				
11	Do you stop providing the drug to food animal if the animal feel better after the first day of treatment*				

Note: The correct answer is always and the reverse one is never.

*Statement reversed scored

Annex 5: Data Collection Tool for The Qualitative Part of the Study

Informed Consent Form
Addis Ababa University, School of pharmacy, department of pharmaceutics and social pharmacy, pharmaco-epidemiology and social pharmacy unit
Study Title: assess animal owners' perspective and facility practice on antimicrobial medicines use in food animals in the context of selected government veterinary clinics in Gondar town and its surrounding
Introduction and study objective
Hello, my name is Atsede Getaneh, and I am contacting you to do my research. I collected data on antimicrobial use on food animals by assessing animal owner perspectives and facility practices. The data is important to know antimicrobial drug use on food animals in Gondar and its surrounding. Your responses will be strictly anonymous, meaning that your name or any personalized information will not be used or appear in any documents, communications, or analyses related to these data. Participation is strictly voluntary, and you do not have to answer all questions you do not wish to. You can out withdraw consent at any time. Your responses will be integrated with others persons included in the study on Gondar and its surroundings to ensure the use of antimicrobials for food animals is rational or irrational. There is no guarantee of immediate benefit from your participation, yet, the results will help Your self, the veterinary drug and food administration, and control authority (VDFACA), and regional agriculture organizations to prevent and minimize the irrational use of antimicrobials in Gondar town and surrounding. To participate you are requested to: 1) collaborate with my data collectors to respond to questions linked to the study 2) authorize the use of these data while maintaining anonymity
Confidentiality
The interviewer will maintain complete confidentiality during the interview. The other interviewers or reviewers of the report will NOT be told your name or any other personally identifiable information.
Risks

Although the interviewer will never, under any circumstances, disclose your name or personal details about you being contacted to anyone. If users of the data guess (based on your location) or if you choose to disclose your identity to anyone, there may be a risk that your identity is revealed and linked to the results of the assessment.

Benefits

The benefit of your participation in this exercise is that the data arising from this assessment will be used in different ways by Gondar and surrounding animal owners by improving the knowledge of the importance of proper use of antimicrobials for food animals. And also used to improve the activity of government veterinary clinics in Gondar town and its surroundings.

Who to contact

If you decide to participate in this exercise and you have additional doubts or questions, you can communicate with the investigator and advisor.

Investigator: Atsede Getaneh; advisor: dr. Eskinder Eshetu

phone: 0937384034 email: eskeshet@gmail.com

Email: atsedegetaneh@gmail.com

Verbal consent and agreement

If you would like to participate, please confirm that you understood everything I have told you about this exercise. Do you have any questions? (Let the participant ask to have any questions).

Do you agree to allow us to start the anonymous partner tracing process? (Staff to fill out the part below and sign and give the participant a copy.)

Agrees to participate	
Does Not agree to participate	

I understand the study aims and objectives and have decided to allow the partner tracing process to go forward.

Name:	Day/Month/Year
Signature:	___/_____/_____
Person Obtaining Consent:	
Name:	Day/Month/Year
Signature:	___/_____/_____

Thank you for your participation in the study

I. Background Information on Informant

Interviewer_____ Date of Interview_____

Time Started _____ Time Finished _____

II. Socio-demographic information

"Encircle the right answer"

Background information	**Answers**
1. Gender	□1 Male □2 Female
2. Age	□1 15- 24 □2. 25 - 54 □3. 55-64 □4. >65Years
3. Education	□1 No formal education □2 First cycle primary education (1-4 Grade) □3 Second cycle primary education (5-8Grade) □4 High school (9-10 Grade) □5 High school/preparatory (11-12 Grade) □6 Technical training /college diploma □7 Bachelor's degree □8 MA/MSc and above

III. Interview guide

1. How do you assess the use of antimicrobials in your animals?

    1.1. How did you know the presence of disease in your animal?

    1.2. How do you select medicines to treat them?

2. Have you ever used antimicrobial medicines on your animals before?

    2.1. What type of medicines did you use?

    2.2 What was the purpose of using the medicine in your animal?

3. Overall, in your opinion, which medicines are most commonly used in Animals ((drugs identify by color or their Amharic name)?

    3.1 Which animals are mostly treated with the medicines?

4. What are the sources of medicines for you to use in treating your food animals?

    4.1 Probe: veterinary clinics, human medicines, informal sector (from kiosks, markets, etc.), leftover medicines from previous visits)

4.2. What are your reasons to resort to each of the above-mentioned sources?

4.3 How do you assess the quality of the medicines from each source?

5. What are your opinions about using human medicine on animals and vice versa?

5.1 Have you ever used human medicine on animals and vice versa? Please tell us more about your experiences and why?

6. What sources of information do you use to know the dose, duration, frequency, and administration of antimicrobials for your animals?

6.1 Do you ask for the recommendation of a professional? Do you follow their recommendations? Why?

7. What is your opinion on how to administer antimicrobials to your animals?

7.1 When do you stop administering the medicine to the animal?

7.2. Do you increase or decrease the dose and frequency of the antimicrobial

7.3 What do you do if the animal is not showing any recovery? Why?

8. What do you do with leftover medicines in your home?

8.1 Selling, giving to others, etc.

9. What is your opinion about the effect of the inappropriate use of medicines in animals could be on the health of human beings?

9.1. Do you what does mean drug resistance?

9.2. What are the causes (reduce the dose of antimicrobials)?

10. from your point of view, are there any relevant issues or questions that you feel should be addressed but weren´t mentioned thus far?

Thank you very much for the second time for your time and cooperation!!!

Annexes (Amharic version)

Annex I: Participant information and consent form (Amharic Version)

የጥናቱ የተሳታፊዎች ስምምነት ቅጽ
በአዲስ አበባ ዩኒቨስርቲ ጤና ሳይንስ ኮሌጅ የፋርማሲ ትምህርት ቤት **ፋርማሲትዩክስና ሶሻል ፋርማሲ ትምህርት ክፍል** **ፋርማኮኢፒዲሚዮሎጅ እና ሶሻልፋርማሲ ዩኒት**
የጥናቱ ርዕስ፡ የእንስሳት ባላሀብቶችን እይታ እና የድርጅቶችን ልምድ በመገምገም ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት አጠቃቀም ሁኔታ በጎንደር ከተማ እና አካባቢው ባሉ የመንግስት የእንስሳት ክሊኒኮች ውስጥ ምን ይመስላል በሚል ርዕሰ ጉዳይ ላይ የዳሰሳ ጥናት ማድረግ ነው።
መግቢያና የጥናት ዓላማዎች
ጤና ይስጥልኝ፣ ሥሜ አፀደ ጌታነህ ይባላል። የማናግርዎት የኔን ጥናታዊ ጽሁፍ ለመጻፍ ነው። የጥናቱ አላማ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መድሂኒት አጠቃቀም ምን ይመስላል የሚለውን የእንስሳት ባላሀብቶችን እይታ እና የድርጅቶችን ልምድ በመገምገም መረጃ ማግኘት ነው። የሚገኘው መረጃ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት አጠቃቀም በጎንደር ከተማ እና አካባቢው ባሉ የመንግስት የእንስሳት ክሊኒኮች ምን እንደሚመስል ለማዎቅ ይጠቅማል። መልሰዎ በማን የተሰጠ እንደሆነ በፍጹም አይታወቅም፤ ማለትም፣ ሥምዎ ወይም ግላዊ መረጃዎ ከዚህ መረጃ ጋር በሚገናኙ በማናቸውም ዶክመቶች፣ የመረጃ ልውውጦች፣ ወይም ትንተናዎች ውስጥ አይታዩም። ተሳትፎዎ ፍጹም በፍቃደኝነት ላይ የተመሠረተ ነው፤ እናም መመለስ የማይፈልጓቸውን ጥያቄዎችን አለመመለስ ይችላሉ። ፍቃደኝነትዎንም በማንኛውም ጊዜ ማንሳት ወይም መከልከል ይችላሉ። በጎንደር ከተማ እና አካባቢው ያሉ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት በአግባቡ ይጠቀማሉ ወይስ አይጠቀሙም የሚለውን ለማረጋገጥ እንዲሁም እንዲሻሻል ይረዳል። መልሰዎ ሌሎች ሰዎች ከሚሰጡ መልሶች ጋር የሚደመሩ ይሆናሉ። በመሳተፍዎ ምክንያት ወዲያውኑ የሚያገኙት ጥቅም አይኖርም፤ ነገር ግን፣ ውጤቶቹ በጎንደር ከተማ እና አካባቢው ያለውን ትክክለኛ ያልሆነ የፀረ- ተህዋሲያን መዳኒት አጠቃቀምን ለመከላከል እና ለመቀነስ ለእስዎ፤ ለእንስሳት መዳኒተና ምግብ አስተዳደር እና ቁጥጥር ባለስልጣን፤ እንዲሁም ለ ከተማው ግብርና ድርጅት የሚረዳ ነው። ለመሳተፍ የሚከተሉትን ይጠየቃሉ፡- 1) ወሳኝ ከሆኑ የጥናቱ ርዕሰ ጉዳይ የተያያዙ ጥያቄዎችን ለመመለስ ከመረጃ ሰብሳቢዎቻችን ጋር መተባበር፣ 2) ይህ መረጃ ማንነትዎን በማይገልጽ መልኩ ጥቅም ላይ እንዲውል ፍቃደኛ መሆን።
ሚስጥራዊነት
በቃለ መጠይቁ ጊዜ ምሥጢራዊነትን ሙሉ በሙሉ ይጠብቃሉ። ሌሎች ቃለ መጠይቅ አቅራቢዎች ወይም ገምጋሚዎች ሥምዎት ወይም ሌላ የግል ማንነትዎን ሊገልጹ የሚችሉ መረጃዎች በፍጹም

አይነገራቸውም።
ሊኖሩ የሚችሉ ያልተፈለጉ ውጤቶች
ቃለ መጠየቅ አቅራቢው ሥምዎንም ሆነ ከማን ጋር እንደተገናኙ የሚያሳዩ የግል ዝርዝር መረጃዎች በፍጹም የማያሳውቅ ወይም የማይገልጥ ቢሆንም፣ የመረጃው ተጠቃሚዎች ስላሉበት ቦታ ያለውን መረጃ መሠረት በማድረግ ማንነትዎን ቢገምቱ ወይም ማንነትዎን ለማንኛውም ሰው ቢገልጹ፣ ማንነትዎ ሊታወቅና ከጥናቱ ውጤቶች ጋር ሊያያዝ የሚችልበት ዕድል አለ።
ጥቅሞች
በዚህ ጥናት መሳተፍዎ ያለው ጥቅም ከዚህ ጥናታዊ ጽሁፍ ግምገማ በመነሳት የፀረ- ተህዋሲያን መዳኒቶች ለምግብነት ለሚውሉ እንስሳት በአግባቡ መጠቀም ስለአለው ጠቀሜታ በ ጎንደርና አካባቢው ያሉ እንስሳት ባለቤቶች እስዎን ጨምሮ የነበረዎትን እውቀት ይጨምራል ተብሎ ይታመናል እንዲሁም በ ጎንደርና አካባቢው ያሉ የእንስሳት ክሊኒኮች አሰራራቸውን እንዲያሻሽሉ ይረዳል።
መረጃ ቢፈልጉማንን ማግኘት ወይም ተጨማሪ ማብራሪያ መጠየቅ እችላለሁ?
በዚህ ጥናት ለመሳተፍ ከወሰኑ እና ምንም ዓይነት ጥያቄ ወይም ግልፅ እንዲደረግልዎት የሚፈልጉት ነገር ካለዎት ከታች በተቀመጡት አድራሾች አጥኝውን ወይም አማካሪ አጥኝዉን ማግኘት ይችላሉ። ዋናዋ አጥኝ : አጸደ ጌታነህ አማካሪ አጥኝ: ዶ/ር እስክንድር እሸቱ ዓሊ ሥልክ ቁጥር: 09 37384034 ኢ-ሜይል: eskeshet@gmail.com ኢ-ሜይል: atsedegetaneh@gmail.com
በቃል የሚገለጽ የፍቃደኝነት ስምምነት
መሳተፍ ከፈለጉ እባክዎትን ከላይ የተቀመጡትን ሃሳብ በትክክል መገንዘቦትን ያረጋገጡልን። (ተጠያቂው ጥያቄ ካላቸው እንዲጠይቁ ያበረታቱ) እባኮት ምንም ዓይነት ጥያቄ ካለዎት? (ተሣተፊዉ ማንኛዉንም ጥያቄ እንዲጠይቁ ጠያቂዉ ይጋብዝ)
የመረጃው ባለቤት ማንነት የማይገለጽበትን ይህን የጥናት ሂደት እንድንጀምር ፍቃደኛ ነዎት?

ለመሳተፍ ይስማማሉ	
ለመሳተፍ አይስማሙም	

የጥናቱን ዓላማዎችና ግቦች ተረድቻለሁ፤ እናም የ ጥናት ሂደቱ ላይ ለመሳተፍ ወስኛለሁ።		
ሥም፡-		
ፊርማ፡-	ቀን/ወር/ዓ.ም ____/_____/_____	
ፍቃደኝነቱን ያገኘው ሰው፡-		
ሥም፡-		
ፊርማ፡-	ቀን/ወር/ዓ.ም ____/_____/_____	

Annex II: Data Collection Tool for The Quantitative Part of The Study (KAP) (Amharic Version)

ቃለ-መጠይቅ፡ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት አጠቃቀም በእንስሳት ባላሀብቶች እይታ እና የድርጅቶች ልምድ በጎንደር ከተማ እና አካባቢው ባሉ የመንግስት የእንስሳት ክሊኒኮች

፩፡ ቃለ-መጠይቅ ሰጪው አጠቃላይ መረጃ፡

የጠያቂ ሥም፡_____	የቃለ-መጠይቅ የተደረገበት ቀን: ____/___/___
የጠያቂ ፊርማ፡_____	የቃለ-መጠይቁ የተጀመረበት ሰዓት፡ _____
	የቃለ-መጠይቁ ያለቀበት ሰዓት፡_____

□□**የማህበራዊና ሕዝብ ነክ መረጃዎች**

ትክክለኛው መልስ ላይ ያክብቡ

ጥያቄዎች	የተሣታፊ ምላሽ
1. ፆታ	□1 ወንድ □2 ሴት
2. ዕድሜ	□1 15- 24 □2 25 - 54 □ 3 55-64 □4 >65Years
3. የትምህርት ደረጃ	□1 መደበኛ ትምህርት ያልተማረ □2 ዙር-አንድ የመጀመሪያ ደረጃ ትምህርት (1-4 ክፍል) □3 ዙር-ሁለት የመጀመሪያ ደረጃ ትምህርት (5-8 ክፍል) □4 ሁለተኛ ደረጃ ትምህርት (9-10 ክፍል) □5 መሰናዶ ደረጃ ትምህርት (11-12 ክፍል) □6 የሙያ ትምህርት/ ኮሌጅ ዲፕሎማ □7 የመጀመሪያ ድግሪ □8 ሁለተኛ ድግሪ እና ከዛ በላይ
4. የመኖሪያ አከባቢ	□1. ከተማ (ጎንደር ከተማ) □2. ገጠር (ጎንደር ዙሪያ)

፫፥ <u>የእንስሳት ባለቤቶችን እውቀት መገምገሚያ ጥያቄዎች</u>

ተ.ቁ.	ስለ ፀረ-ተህዋሲያን መዳኒቶች አጠቃቀም የእውቀት ደረጃን መገምገሚያ ጥያቄዎች	መልስ
1	ፀረ-ተህዋሲያን መዳኒቶች ለባክተሪያ ማከሚያና መከላከያ እንደሚያገለግል ያውቃሉ?	
2	ፀረ-ተህዋሲያን መዳኒቶች አምራቹ በሚያዘው መሰረት ደህንነቱ የተጠበቀ ቦታ መቀመጥ እንዳለበት ያውቃሉ?	
3	የተለያዩ መዳኒቶች በአንድ ጊዜ መጠቀም አንዱ የሌላውን መዳኒት የማዳን አቅም እንደሚቀንሰው ያውቃሉ?	
4	የፀረ-ተህዋሲያን መዳኒቶች በስጋ፤በወተት እና በእንቁላል ላይ ለተወሰነ ጊዜ ሊቆይ እንደሚችል ያውቃሉ?	
5	መዳኒት በእንስሳት ስጋ፤ወተት እና እንቁላል ውስጥ እንዳይቀር የግድ በመዳኒት ማዘዣው ላይ የተገለጸውን ያህል ጊዜ መጠበቅ እንዳለብዎት ያውቃሉ?	
የፀረ-ተህዋሲያን መዳኒቶችን ሲጠቀሙ ስላለው ውጤት ያላቸውን እውቀት መገምገሚያ ጥያቄዎች		
6	ፀረ-ተህዋሲያን መዳኒትን በጥነቃቄ አለመጠቀም የመድኒቱን የማዳን አቅም እንደሚቀንሰወው ያውቃሉ? (የመዳኒቶች መጠን መጨመርም ሆነ መቀነስ)	
7	ህመም ከመፈወስ ውጭ የምንጠቀማቸው ፀረ-ተህዋሲያን መዳኒቶች ለምሳሌ ለማድለቢያና ቅድመ በሽታን ለመከላከል ብለን የምንጠቀማቸው ፀረ-ተህዋሲያን መዳኒቶች በእንስሳዎ ላይ ችግር እንደሚያመጡ ያውቃሉ?	
8	ፀረ-ተህዋሲያን መዳኒት በአግባቡ መጠቀም በተጨማሪም ትክክለኛ የመዳኒት መጠን መጠቀም የዳኒቱን የማዳን አቅም እንደጨምረው ያውቃሉ?	
9	አንድ አይነት መዳኒትን ለረጅም ጌዜ በተደጋጋሚ መጠቀም የመዳኒቱን የማዳን አቅም እንደሚቀንሰው ያውቃሉ?	
ስለፀረ-ተህዋሲያን መዳኒቶች አጠቃቀም ሁኔታ ስላሉ ህግ እና ደንቦች ያላቸውን እውቀት		

መገምገሚያ ጥያቄዎች		
10	ኢትዮጵያ የመዳኒት አጠቃቀምን ለመቆጣጠር ህግ እና ደንብ እንዳላት ያውቃሉ?	
11	የፀረ-ተህዋሲያን መዳኒቶች የግድ በሚመለከተው ባለስለጣን መጽደቅ ወይም መመዝገብ እንዳለባቸው ያውቃሉ?	
12	የፀረ-ተህዋሲያን መዳኒቶችን መሸጥም ሆነ መሰራጨት ያለባቸው ህጋዊ የሆነ ፍቃድ ያላቸው ሰዎች ብቻ መሆን እንዳለበት ያውቃሉ?	
13	የእንስሳት ህክምና ባለሙያዎች በሚያዘጋጁት የመዳኒት ማዘዣ ተጠያቂ እንደሆኑ ያውቃሉ?	

<u>ማስታዎሻ</u>: 0 = አይደለም እና አርግጠኛ አይደለሁም; 1 = አዎ

- ብቸኛው ተክክለኛው መልስ አዎ ነው

<u>፬፥ የእንስሳት ባለቤቶችን የፀረ-ተህዋሲያን መዳኒቶች አጠቃቀም ሁኔታ መገምገሚያ ጥያቄዎች</u>

<u>ትክክለኛው መልስ ላይ “X”ይህን ምልክት ያስቀምጡ</u>

ተ.ቁ.	**ጥያቄዎች**	**በ.እ.**	**እ.**	**አላ.**	**አል.**	**በ.አል.**
1	የፀረ-ተህዋሲያን መዳኒቶች ለቅድመ በሽታ መከላከል መጠቀም ችግር አለው በሚለው ይስማማሉ?					
2	እንስሳቶችዎን ሲያማቸው የእንስሳት ሀኪም ከማማከረዎ በፊት የፀረ-ተህዋሲያን መዳኒት መሰጠት የለበትም በሚለው ይስማማሉ?					
3	ለማድለቢያና ቅድመ በሽታን ለመከላከል ብለን የምንጠቀማቸው ፀረ-ተህዋሲያን መድሃኒቶች በእንስሳዎ ላይ የጎንዮሽ ጉዳት ያመጣል በሚለው ይስማማሉ?					
4	መዳኒቶች የመዳኒት አስተዳደር/አያያዝ ሁኔታ የግድ የእንስሳት ህክምና መመሪያን መከተል አለበት በሚለው					

	ይስማማሉ?					
5	ፀረ-ተህዋሲያን መዳኒቶች አስተማማኝ የሚሆኑት ህጋዊ ፍቃድ ካለው ኩባንያ ወይም ድርጅት ስንገዛ ነው በሚለው ይስማማሉ?					
6	ፀረ-ተህዋሲያን መዳኒቶችን በአግባቡ አለመጠቀም ፀረ-ተህዋሲያን መድሃኒቶች በሽታ የመከላከል አቅማቸው እንዲ ቀንስ ያደርጋል በሚለው ይስማማሉ?					
7	ጠንካራ የሆነ ህግ እና ደንብ አስከባሪ አስተዳደር ካለ ፀረ-ተህዋሲያን መዳኒቶችን በአግባቡ በመጠቀም ፀረ-ተህዋሲያን መዳኒቶች በሽታ የመከላከል አቅማቸው አንዳይቀንስ ያደርጋል በሚለው ይስማማሉ?					
8	የፀረ-ተህዋሲያን መዳኒቶችን ለእንስሳት መጠቀም የሚመረጥበት ምክኒያት ወጭ ስለሚቀንስና ለእንስሳቶች የተለየ የመከላከል አቅም ስለላው ብቻ መሆን የለበትም በሚለው ይስማማሉ?					

<u>ማስታዎሻ:</u> በጣም እስማማለሁ እና እስማማለሁ በ እስማማለሁ ይካተታለሉ

- ተክክለኛው መልስ እስማማለሁ ነው

<u>ሯ፦ የእንስሳት ባለቤቶችን ልምድ መገምገሚያ ጥያቄዎች</u>

ትክክለኛው መልስ ላይ "X"ይህን ምልክት ያስቀምጡ

ተ.ቁ.	ጥያቄዎች	ዘወ.	ብዙ.	አንዳ.	በጭ.
1	ሁልጊዜም መዳኒት የማዘዝ ሃላፊነት ያለባቸው የእንስሳት ህክምና ባለሙያዎች ብቻ ናቸው ብለው ያስባሉ?				
2	የፀረ-ተህዋሲያን መዳኒቶች የቆይታ ጊዜ መድሃኒት አስታዳደሩ የሚያዘውንና የእንስሳት ሀኪሞች				

	የሰጡዎትን ምክር መከተል አለበት ብለው ያምናሉ?				
3	እንስሳትን ወደእርድ ከመላከዎ በፊት የተጠቀሰውን መዳኒት የማስወገጃ ጊዜ (ከሰውተታቸው ይዎጣል ተብሎ እስከተገለጸበት ጊዜ) ይጠብቃሉ?				
4	በመኖሪያ ቤተዎ ውስጥ የፀረ-ተህዋሲያን መዳኒቶችን ደንነቱ የተጠበቀ ቦታ ያስቀምጣሉ?				
5	የፀረ-ተህዋሲያን መዳኒቶችን ለእንስሳተዎ ከመስጠተዎ በፊት የህክምና ባለሙያ ያማክራሉ?				
6	ለእንስሳቶችዎ የፀረ-ተህዋሲያን መዳኒቶችን በዋነኝነት የሚጠቀሙት በሽታን ለመከላከል ነው?*				
7	በእንስሳቶችዎ ላይ ምንም አይነት በሽታ ባይከሰትም የፀረ-ተህዋሲያን መዳኒቶችን ይሰጣሉ?*				
8	ፀረ-ተህዋሲያን መዳኒቶችን ውጤታማነት ለመጨመር ብዛት ያላቸው ፀረ-ተህዋሲያን መዳኒት በአንድ ጊዜ ይጠቀማሉ?*				
9	ለእንስሳቶችዎ ተመሳሳይ የፀረ-ተህዋሲያን መዳኒቶችን ለረዥም ጊዜ ይሰጣሉ?*				
10	ለእንስሳቶችዎ የፀረ-ተህዋሲያንን መዳኒቶችን በትዛዙ መሰረት ሰጠው ለውጥ ባያዩባቸው የመድሃኒቱን መጠንና ድግግሞሹን ጨምረው ይሰጣሉ?*				
11	ለእንስሳቶችዎ የፀረ-ተህዋሲያን መዳኒቶችን ሰጠዋቸው መድሃኒቱ ሳያልቅ የጤንነት መሻሻል ቢያዩ መድሂኒት መስጠተዎን ያቆማሉ?*				

<u>ማስታዎሻ</u>፡- ትክክለኛው መልስ ሁልጊዜ እና ለተቃራኒ ጥያቄወች ደግሞ በፍጹም ነው።

*ይህ ምልክት የተቃራኒ ጥያቄወች ነው።

በድጋሜ ለጊዜዎት እና ለሰጡን መልስ በጣም እናመሰግናለን!!!

Annex III Data Collection Tool for The Qualitative Part of The Study (Amharic Version)

የጥናቱ የተሳታፊዎች ስምምነት ቅጽ
በአዲስ አበባ ዩኒቨርስቲ ጤና ሳይንስ ኮሌጅ የፋርማሲ ትምህርት ቤት **ፋርማሲትዩክስና ሶሻል ፋርማሲ ትምህርት ክፍል** **ፋርማኮኢፒዲሚዮሎጅ እና ሶሻልፋርማሲ ዩኒት**
የጥናቱ ርዕስ፡ የእንስሳት ባላሀብቶችን እይታ እና የድርጅቶችን ልምድ በመገምገም ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒቶች አጠቃቀም ሁኔታ በጎንደር ከተማ እና አካባቢው ባሉ የመንግስት የእንስሳት ክሊኒኮች ውስጥ ምን ይመስላል በሚል ርዕሰ ጉዳይ ላይ የዳሰሳ ጥናት ማድረግ ነው።
መግቢያና የጥናት ዓላማዎች
ጤና ይስጥልኝ፣ ሥሜ አፀደ ጌታነህ ይባላል። የማናግርዎት የኔን ጥናታዊ ጽሁፍ ለመጻፍ ነው። የጥናቱ አላማ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት አጠቃቀም ምን ይመስላል የሚለውን የእንስሳት ባላሀብቶችን እይታ እና የድርጅቶችን ልምድ በመገምገም መረጃ ማግኘት ነው። የሚገኘው መረጃ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት አጠቃቀም በጎንደር ከተማ እና አካባቢው ባሉ የመንግስት የእንስሳት ክሊኒኮች ምን እንደሚመስል ለማዎቅ ይጠቅማል። መልሰዎ በማን የተሰጠ እንደሆነ በፍጹም አይታወቅም፤ ማለትም፣ ሥምዎ ወይም ግላዊ መረጃዎ ከዚህ መረጃ ጋር በሚገናኙ በማናቸውም ዶክመቶች፣ የመረጃ ልውውጦች፣ ወይም ትንተናዎች ውስጥ አይታዩም። ተሳትፎዎ ፍጹም በፍቃደኝነት ላይ የተመሠረተ ነው፤ እናም መመለስ የማይፈልጓቸውን ጥያቄዎችን አለመመለስ ይችላሉ። ፍቃደኝነትዎንም በማንኛውም ጊዜ ማንሳት ወይም መከልከል ይችላሉ። በጎንደር ከተማ እና አካባቢው ያሉ ለምግብነት የሚውሉ እንስሳት የፀረ- ተህዋሲያን መዳኒት በአግባቡ ይጠቀማሉ ወይስ አይጠቀሙም የሚለውን ለማረጋገጥ እንዲሁም እንዲሻሻል ይረዳል። መልሰዎ ሌሎች ሰዎች ከሚሰጡ መልሶች ጋር የሚደመሩ ይሆናሉ። በመሳተፍዎ ምክንያት ወዲያውኑ የሚያገኙት ጥቅም አይኖርም፤ ነገር ግን፣ ውጤቶቹ በጎንደር ከተማ እና አካባቢው ያለውን ትክክለኛ ያልሆነ የፀረ- ተህዋሲያን መዳኒት አጠቃቀምን ለመከላከል እና ለመቀነስ ለእስዎ፤ ለእንስሳት መዳኒተና ምግብ አስተዳደር እና ቁጥጥር ባለስልጣን፤ እንዲሁም ለ ከተማው ግብርና ድርጅት የሚረዳ ነው። ለመሳተፍ የሚከተሉትንይጠየቃሉ፡- 1) ወሳኝ ከሆኑ የጥናቱ ርዕሰ ጉዳይ የተያያዙ ጥያቄዎችን ለመመለስ ከመረጃ ሰብሳቢዎቻችን ጋር መተባበር፣ 2) ይህ መረጃ ማንነትዎን በማይገልጽ መልኩ ጥቅም ላይ እንዲውል ፍቃደኛ መሆን።
ሚስጥራዊነት

በቃለ መጠይቁ ጊዜ ምሥጢራዊነትን ሙሉ በሙሉ ይጠብቃሉ። ሌሎች ቃለ መጠይቅ አቅራቢዎች ወይም ገምጋሚዎች ሥምዎት ወይም ሌላ የግል ማንነትዎን ሊገልጹ የሚችሉ መረጃዎች በፍጹም አይነገራቸውም።
ሊኖሩ የሚችሉ ያልተፈለጉ ውጤቶች
ቃለ መጠየቅ አቅራቢው ሥምዎንም ሆነ ከማን ጋር እንደተገናኙ የሚያሳዩ የግል ዝርዝር መረጃዎች በፍጹም የማያሳውቅ ወይም የማይገልጥ ቢሆንም፣ የመረጃው ተጠቃሚዎች ስላሉበት ቦታ ያለውን መረጃ መሠረት በማድረግ ማንነትዎን ቢገምቱ ወይም ማንነትዎን ለማንኛውም ሰው ቢገልጹ፣ ማንነትዎ ሊታወቅና ከጥናቱ ውጤቶች ጋር ሊያያዝ የሚችልበት ዕድል አለ።
ጥቅሞች
በዚህ ጥናት መሳተፍዎ ያለው ጥቅም ከዚህ ጥናታዊ ጽሁፍ ግምገማ በመነሳት የፀረ- ተህዋሲያን መድሂኒቶች ለምግብነት ለሚውሉ እንስሳት በአግባቡ መጠቀም ስለአለው ጠቀሜታ በ ጎንደርና አካባቢው ያሉ እንስሳት ባለቤቶች እስዎን ጨምሮ የነበረዎትን እውቀት ይጨምራል ተብሎ ይታመናል እንዲሁም በ ጎንደርና አካባቢው ያሉ የእንስሳት ክሊኒኮች አሰራራቸውን እንዲያሻሽሉ ይረዳል።
መረጃ ቢፈልጉማንን ማግኘት ወይም ተጨማሪ ማብራሪያ መጠየቅ እችላለሁ?
በዚህ ጥናት ለመሳተፍ ከወሰኑ እና ምንም ዓይነት ጥያቄ ወይም ግልፅ እንዲደረግልዎት የሚፈልጉት ነገር ካለዎት ከታች በተቀመጡት አድራሾች ወይም አማካሪ አጥኚዉን ማግኘት ይችላሉ። ዋናዋ አጥኚ : አጸደ ጌታነህ አማካሪ አጥኚ: ዶ/ር እስክንድር እሸቱ ዓሊ ሥልክ ቁጥር: 09 37384034 ኢ-ሜይል: eskeshet@gmail.com ኢ-ሜይል: atsedegetaneh@gmail.com
በቃል የሚገለጽ የፍቃደኝነት ስምምነት
መሳተፍ ከፈለጉ እባክዎትን ከላይ የተቀመጡትን ሃሳብ በትክክል መገንዘቦትን ያረጋገጡልን። (ተጠያቂው ጥያቄ ካላቸው እንዲጠይቁ ያበረታቱ) እባኮት ምንም ዓይነት ጥያቄ ካለዎት? (ተሣተፊዉ ማንኛዉንም ጥያቄ እንዲጠይቁ ጠያቂዉ ይጋብዝ)
የመረጃው ባለቤት ማንነት የማይገለጽበትን ይህን የጥናት ሂደት እንድንጀምር ፍቃደኛ ነዎት?
ለመሳተፍ ይስማማሉ
ለመሳተፍ አይስማሙም
የጥናቱን ዓላማዎችና ግቦች ተረድቻለሁ፤ እናም የ ጥናት ሂደቱ ላይ ለመሳተፍ ወስኛለሁ።
ሥም፡-
ፊርማ፡- ቀን/ወር/ዓ.ም ___/_____/____
ፍቃደኝነቱን ያገኘው ሰው፡-
ሥም፡-
ፊርማ፡- ቀን/ወር/ዓ.ም ___/____/_____

፩፡ <u>ቃለ-መጠይቅ ሰጪው አጠቃሊይ መረጃ፡</u>

የጠያቂ ሥም፡_____ የጠያቂ ፊርማ፡_____	የቃለ-መጠይቅ የተደረገበት ቀን: _____/___/___ የቃለ-መጠይቁ የተጀመረበት ሰዓት፡ _____ የቃለ-መጠይቁ ያለቀበት ሰዓት፡_____

፪፡ <u>የማህበራዊና ሕዝብ ነክ መረጃዎች</u>

ትክክለኛው መልስ ላይ ያክብቡ

ጥያቄዎች	የተሣታፊ ምላሽ
1. ፆታ	□1 ወንድ □2 ሴት
2. ዕድሜ	□1 15- 24 □2 25 - 54 □ 3 55-64 □4 >65Years
3. የትምህርት ደረጃ	□1 መደበኛ ትምህርት ያልተማረ □2 ዙር-አንድ የመጀመሪያ ደረጃ ትምህርት (1-4 ክፍል) □3 ዙር-ሁለት የመጀመሪያ ደረጃ ትምህርት (5-8 ክፍል) □4 ሁለተኛ ደረጃ ትምህርት (9-10 ክፍል) □5 መሰናዶ ደረጃ ትምህርት (11-12 ክፍል) □6 የሙያ ትምህርት/ ኮሌጅ ዲፕሎማ □7 የመጀመሪያ ድግሪ □8 ሁለተኛ ድግሪ እና ከዛ በላይ
4. የመኖሪያ አከባቢ	□1. ከተማ (ጎንደር ከተማ) □2. ገጠር (ጎንደር ዙሪያ)

፫፥ <u>የቃለ-መጠይቅ መምሪያ</u>

1. ለእንስሳቶችዎ የፀረ-ተህዋሲያን መዳኒቶችን አጠቃቀም እንዴት ያዩታል?

    1.1. በእንስሳተዎ ላይ በሽታ ሲከሰት እንዴት ያውቃሉ?

    1.2. እንስሳቶችዎን ለማከም የሚሰጡትን መዳኒት እንዴት ይመርጣሉ?

2. ከዛሬ በፊት ለእንስሳቶችዎ የፀረ-ተህዋሲያን መዳኒቶችን ሁልጊዜ ይጠቀማሉን?

    2.1. የትኞቹን መዳኒቶች ነው የሚጠቀሙት?

    2.2. ለእንስሳቶችዎ መዳኒቶች ለምን አላማ ነው የሚጠቀሙአቸው?

3. በእስዎ አመለካከት ለእንስሳቶችዎ በአጠቃላይ የትኞቹን መዳኒቶች ነው በብዛት የሚጠቀሙት?

    3.1. ብዙ ጊዜ መዳኒት የሚጠቀሙት ለየትኞቹ እንስሳትዎ ነው?

4. ለምግብነት ለሚውሉ እንስሳትን የሚያክሙበት መዳኒት የሚያገኙት ከየት ነው?

    4.1. ከእንስሳት ክሊኒክ፤ ከሰው መዳኒት ቤት፤ ሀጋዊ ካልሆኑ ቦታዎች ((ትንሽ ሱቅ፤ ገቢያ ወዘተ…) በፊት ተገዝቶ የተረፈ መዳኒት)

    4.2. ከላይ ከተገለጹት ቦታዎች በተደጋጋሚ የሚገዙበት ምክንያት ምንድን ነው?

    4.3. ከእያንዳንዱ ቦታ የሚገዙትን መዳኒቶች የጥራት ሁኔታ እንዴት ያዩታል?

5. የሰውን መዳኒት ለእንስሳት እንዲሁም በተቃራኒው ስለመጠቀም ያለዎት የግል አስተያየት ምንድን ነው?

    5.1. የሰውን መዳኒት ለእንስሳት እንዲሁም በተቃራኒው ተጠቅመው ያውቃሉ? ልመድ ካለዎት አባከዎትን ይንገሩኝ? ለምን?

6. ለእንስሳተዎ የጸረ- ተህዋሲያን መዳኒቶችን መጠን፤ የሚፈጀው ጊዜ፤ በቀን ውስጥ ለምን ያህል ጊዜ እንደሚሰጥ እና እንዴት እንደሚሰጥ እንዴት ያውቃሉ?

    6.1. ባለሙያ ያማክራሉን? የባለሙያውን ምክር በአግባቡ ይተገብራሉን? ለምን?

7. ለእንስሳተዎ ስለጸረ- ተህዋሲያን መዳኒቶች አሰጣጥ ሁኔታ ያለዎት አመለካከት ምን ይመስላል?

    7.1. ለእንስሳተዎ መዳኒት መስጠት የሚያቆሙት መቼ ነው?

    7.2. የጸረ- ተህዋሲያን መዳኒቶችን መጠን እና የሚሰጥበትን ጊዜ ይጨምራሉ ወይም ይቀንሳሉን?

    7.3. እንስሳተዎ ምንም አይነት የመዳን ምልክት (ለውጥ) ባያሳዩ ምን ያደርጋሉ? ለምን ?

8. መዳኒቶችን ወደ ቤተዎ ከወሰዱ በዋላ ምን ያደርጋሉ?

8.1. ይሸጡታል፤ ለሌላ ሰው ይሰጡታል፤ ሌላ ካለ?

9. የጸረ- ተህዋሲያን መዳኒቶችን በአግባቡ አለመጠቀም በእንስሳተዎ እንዲሁም በሰው ልጅ ሰለሚያመጣው ችግር ምን ይላሉ?

10. በእሰዎ አመለካከት እኛ ያላካተትናቸው መካተት ነበረባቸው የሚሉአቸው ሀሳቦች ወይም ጥያቄዎች ካሉ?

በድጋሜ ለጊዜዎትን እና ለሰጡን መልስ በጣም እናመሰግናለን!!!

Annex IV: Ethical clearance

በ ፋርማሲ ት/ቤት
የኢቲካል ሪቪው ኮሚቴ

አዲስ አበባ ዩኒቨርሲቲ
Addis Ababa University

School of Pharmacy
Ethical Review Committee

ቀን Date: August 31, 2021

ቁጥር Ref. No.: ERB/SOP/350/13/2021

To: **Atsede Getaneh**
School of Pharmacy

Re: Ethical Clearance

It is to be recalled that you submitted a research proposal entitled "**Assessment of Animal Owners' Perspective and Facility Practice on Antimicrobial Medicines Use in Food Animals in The Context of Selected Government Veterinary Clinics in Gondar Town and Its Surrounding.**" The committee thoroughly reviewed the proposal based on its operational guidelines and found that it fulfills all the ethical requirements stipulated in the guidelines. This is, therefore, to inform you that the proposal is ethically approved for implementation.

With best regards,

Shemsu Umer (PhD)
Chairperson, ERC
School of Pharmacy
College of Health Sciences
Addis Ababa University

ፋርማሲ ት/ቤት School of Pharmacy

00251156 02 12 | 1176 | ቴሌክስ Telex: 21205 | ፋክስ Fax: 00251(11)1558566 | ቴሌግራም Cable: AAUNIV

Scanned by CamScanner