

Assessment of Ruminal Disorders and Their Therapeutic Management at Three Veterinary Clinics in Gondar Town, North Western Ethiopia: A Retrospective Study

This article was published in the following Dove Press journal:
Veterinary Medicine: Research and Reports

Mebrie Zemene Kinde¹
Edom Asfaw²

¹University of Gondar, College of Veterinary Medicine and Animal Sciences, Unit of Biomedical Sciences, Gondar, Ethiopia; ²University of Gondar, College of Veterinary Medicine and Animal Sciences, Department of Veterinary Pharmacy, Gondar, Ethiopia

Background: Ruminal disorders are a major threat to the health and welfare of animals worldwide especially in developing countries like Ethiopia. However, there is no recent published report on ruminal disorders and the possible management methods at veterinary clinics in Gondar town. The aim of this study was to identify the common ruminal disorders and treatments given to manage these disorders.

Methods: A retrospective study was carried out to identify the common ruminal disorders and their therapeutic management of ruminants (cattle, sheep and goat). Data on 127 cases of animals treated for ruminal disorders in three veterinary clinics were collected from case registration books. The data were analyzed using SPSS version 20 statistical software and descriptive statistics and nonparametric tests were used to analyze the data.

Results: Ruminal disorders including simple indigestion, ruminal acidosis, free gas bloat and frothy bloat were identified. From these, 44.1% ruminal acidosis, 26% frothy bloat, 15.7% free gas bloat and 14.2% simple indigestion were identified. Of the total ruminal disorders, 67.7%, 8.6% and 23.6% occurred in bovine, caprine and ovine, respectively. Eighty-six point six percent and thirteen point four percent of ruminal disorders were in young and adult, respectively. The highest rate of ruminal disorders was seen at University of Gondar veterinary clinic. With regard to season, the highest prevalence of these disorders were reported in winter (31.1%) and spring (31.1%). The highest cases were treated using a combination of indigestion powder and antimicrobial (24.4%), followed by a combination of liquid paraffin and indigestion powder (23.6%). All cases were diagnosed empirically, without getting definitive diagnosis.

Conclusion: The findings had shown that ruminal disorders are the major challenges for livestock production in the study areas. Drug prescription without correct diagnosis was also observed. Therefore, accurate veterinary diagnosis and proper management of ruminal disorders as well as proper animal husbandry and feeding management are important to reduce the impact of ruminal disorders.

Keywords: assessment, Gondar town, retrospective, ruminal disorder, therapeutic management

Correspondence: Mebrie Zemene Kinde
University of Gondar, College of Veterinary Medicine and Animal Sciences, Unit of Biomedical Sciences, Gondar, Ethiopia
Email: zemenemebrie@gmail.com

Introduction

Ethiopia is a home for many livestock species and suitable for livestock production. The livestock subsector in Ethiopia is a huge contributor to the national economy and is the cornerstone for livelihoods of more than 80% of Ethiopians.

Cattle, sheep and goats are the three most important livestock species that are large in number and have a considerable contribution to the gross domestic product (GDP) of the country. Despite this, their contribution is below their expected potential due to rampant animal diseases including ruminal disorders, poor nutrition, poor husbandry, poor infrastructure, and shortage of trained man power and lack of government policies.

Ruminal disorder is one of the major threats to the health and welfare of animals worldwide. The most common ruminal disorders/dysfunctions are usually defined as indigestion. The term indigestion is a general term for a group of diseases that describe mainly the reticuloruminal dysfunction.⁴ In ruminants, frothy/free gas bloat, ruminal acidosis and simple indigestion are commonly encountered ruminal disorders which are characterized by poor appetite, change in ruminal pH towards either side, decreased ruminal motility and reduced protozoal counts.⁵ Such disturbances may be due to over-feeding with some feed stubbles, sudden change in the diet, consumption of indigestible roughages as well as oral dosing with sulphonamides and antibiotics.⁶

Ruminal disorders have a high morbidity that can result in great losses both in production and costs of treatment of affected animals. In addition, ruminal disorders cause a huge economic loss due to high mortality, feed wastage, delayed marketing, unthriftiness of the recovered animals, incomplete utilization of disease provoking food and extra labor costs of preventive and therapeutic measures.⁷

Management of ruminal dysfunctions has relied on agents and mixtures that restore the normal ruminoreticular environment, reduce foam stability and promote release of free gas such as ruminal acidifying and alkalinizing agents, antifoaming agents, and motility modifiers. However, improper utilization of these agents may cause a serious problem to the animal. These agents are widely used by ruminant practitioners for the empirical treatment of various conditions, including anorexia of unknown origin. Often these treatments are administered without use of laboratory data (ie rumen fluid analysis) that can lead to serious adverse effects, including disturbance in electrolyte balance and the rumen microenvironment. Therefore, these compounds should only be administered to ruminants with a confirmatory diagnosis.⁸ Many studies have been conducted to know the status of infectious disease in Ethiopia as well as Gondar town.^{9–13} However, the status of ruminal disorders and therapeutic managements utilized to control these disorders is not known in Gondar town. For effective management and

control of the problem, identification of the type of ruminal disorders and the control strategies utilized in the area is crucial. Therefore, the objectives of this study were to identify the common ruminal disorders and treatments given for these disorders in veterinary clinics found in Gondar town.

Materials and Methods

Study Area

The study was conducted at University of Gondar (UOG) veterinary teaching clinic, Hawariyaw pawlos veterinary clinic and Azezo veterinary clinic which are found in Gondar town (Figure 1). Gondar town is located in the North Gondar administrative zone of Amhara regional state, 728 km north west of Addis Ababa (the capital of Ethiopia). It is situated at 12.3–13.8°N, latitude and 35.3–35.7°E, longitude and an altitude of 2200 meters above sea level. The ranges of maximum and minimum temperature vary between 22–30.7 °C and 12.3–17.1 °C, respectively. The region receives a bimodal rainfall, the average annual precipitation rate being 1000 mm. The short rains occur during the months March, April and May while the long rains extend from June up to September.¹⁴ Farmers near to Gondar town practice a mixed crop-livestock farming system.¹⁵ According to the CSA,¹⁶ there were 78,123 cattle, 25,067 sheep, and 21,515 goats within Gondar town.

Study Animals

The study consisted of ruminant animals (cattle, sheep and goat) which were brought to UOG veterinary teaching clinic, Azezo veterinary clinic and Hawariyaw pawlos veterinary clinic for diagnosis and treatment of ruminal disorders. The studied sheep and goats were categorized into two age groups, young (≤ 1.5 years) and adult (> 1.5 years).^{17,18} The cattle were also grouped into young (≤ 3 years) and adult (> 3) based on age.¹⁹

Study Design

A retrospective study was carried out at UOG veterinary clinic, Hawariyaw pawlos veterinary clinic and Azezo veterinary clinic to identify the common ruminal disorders and their therapeutic managements from December 2016 to June 2017.

Method of Data Collection

Data was collected retrospectively from case registration books in the three veterinary clinics in Gondar town. It was collected from case books written (retrospectively

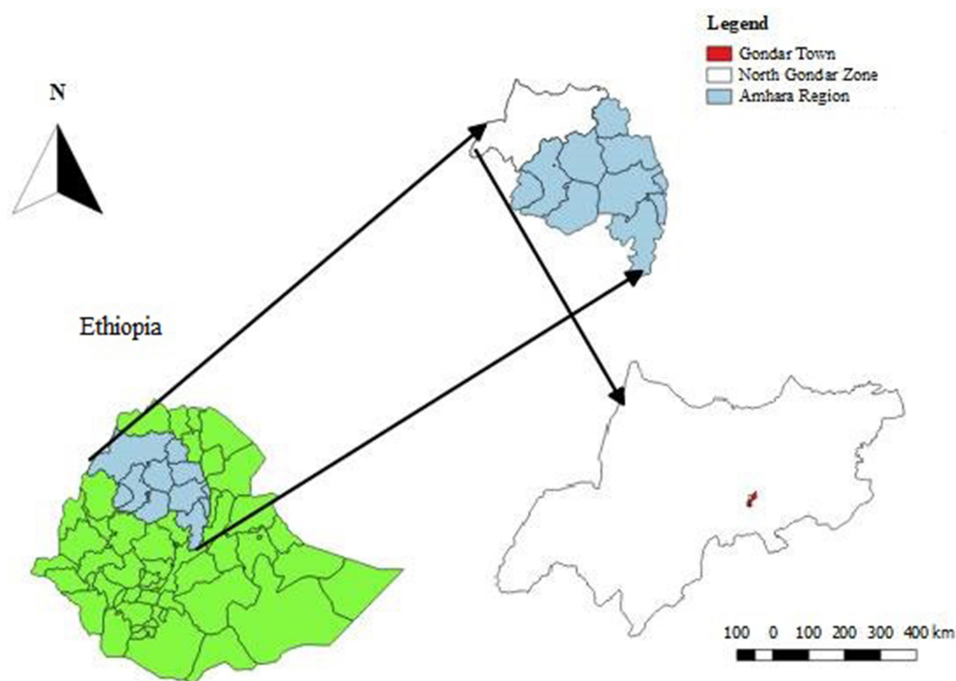


Figure 1 Map that shows the study area. The map is created using QGIS version 3.14.

registered) for the last two years and four months (from January 1, 2015 to April 30, 2017) as before that the data was not registered clearly on the case books. Data from all cases that came to these clinics for treatment of ruminal disorder was gathered. The specific data necessary to the study was recorded for each cases. For this study, data on 127 cases that contain the treated animal's characteristics (age and species), disease diagnosis (name, empiric or physical clinical examination and confirmatory laboratory tests used), prescribed drugs and route of administration were collected.

Data Analysis

All the data necessary to the study was recorded on a data record sheet/form. The data in the record form was entered into Microsoft Excel spread sheet and analyzed using Statistical Package for Social Sciences (SPSS) version 20 statistical software. Descriptive statistics (frequency and percentage) and nonparametric tests were (confidence interval) used to analyze the data.

Results

Frequency of Ruminal Disorders

Retrospective data was collected on a total of 127 cases of animals treated for ruminal disorders in the three veterinary clinics in Gondar town from January 1, 2015 to

April 30, 2017 and analyzed. Ruminal disorders, including simple indigestion, ruminal acidosis, free gas bloat and frothy bloat, were identified. From the total ruminal disorders (127), ruminal acidosis and simple indigestion comprised the highest (44.1%) and the lowest (14.2%) prevalence, respectively (Table 1).

Ruminal Disorders Based on Species, Age, Clinic and Season

Based on species of animal, out of the total ruminal disorders, 86 (67.7%), 11 (8.6%) and 30 (23.6%) occurred in bovine, caprine and ovine, respectively. One hundred ten (eighty-six point six percent) and seventeen (thirteen point four percent)

Table 1 Percentage of Ruminal Disorders Treated in the Three Veterinary Clinics in Gondar Town from January 1, 2015 to April 30, 2017

Ruminal Disorders	Frequency	Percentage (%)	95% Confidence Interval	
			Lower	Upper
Frothy bloat	33	26.0	0.186	0.345
Free gas bloat	20	15.7	0.099	0.233
Acidosis	56	44.1	0.353	0.532
Simple indigestion	18	14.2	0.086	0.215
Total	127	100		

of ruminal disorders were in young and adult, respectively. The highest rate of ruminal disorders was seen at UOG veterinary clinic. The occurrence of ruminal disorders also varied by season and the highest proportion of these disorders happened in winter (31.1%) and spring (31.1%) (Table 2).

Drugs Used to Treat Ruminal Disorders

In this study the type of drugs utilized for the treatment of ruminal disorders was assessed. Different kinds of treatments were given to manage different ruminal disorders. Treatment using a single drug as well as combined drugs were utilized to treat these disorders. The highest percentage of the disorders were treated using a combination of indigestion powder and antimicrobial (24.4%) followed by a combination of liquid paraffin and indigestion powder (23.6%). Seventeen (thirteen point four percent) of the cases were treated using only antimicrobials (Table 3). Eighty-six (sixty-seven point five percent) of the cases were also treated via a combination of drugs. The highest percentage of cases treated using only antimicrobials was at Hawariyaw pawlos veterinary clinic, 9 (7.1%), followed by Azezo veterinary clinic, 6 (4.7%) (Table 4).

Type of Diagnosis Utilized

The types of diagnosis utilized to identify ruminal disorders were also assessed. All cases which were brought with ruminal disorders in the study areas 127 (100%) were diagnosed and treatment was given empirically, without getting definitive (laboratory-supported) diagnosis.

Discussion

The present study indicated ruminal disorders are the major livestock production challenge in the study area. Acidosis, frothy and free gas bloat and simple indigestion were the major ruminal problems identified. In this study, ruminal acidosis comprised the highest percentage of ruminal disorders. This may be due to improper feeding management practice in the study area, with livestock being fed relatively high concentrate diets to achieve maximum production. Animals being fed a low energy ration are most susceptible to a rapid change to a high energy ration because satisfactory adaptation cannot occur quickly enough and they develop acute ruminal acidosis immediately after they have been exposed.²⁰

In the current study, the percentage of ruminal disorder among different species of animals was highest in bovine. This may be due to the difference in feeding habits among

Table 2 Percentage of Ruminal Disorders Based on Species, Age, Season and Clinic in the Three Veterinary Clinics in Gondar Town from January 1, 2015 to April 30, 2017

Characteristics	Frequency	Percentage (%)	95% Confidence Interval	
			Lower	Upper
Species				
Bovine	86	67.7	0.588	0.757
Ovine	30	23.6	0.165	0.320
Caprine	11	8.7	0.044	0.150
Age				
Adult	110	86.6	0.794	0.920
Young	17	13.4	0.080	0.206
Season				
Winter	42	33.1	0.250	0.420
Spring	42	33.1	0.250	0.420
Summer	20	15.7	0.099	0.233
Autumn	23	18.1	0.118	0.259
Clinic				
UOG veterinary clinic	64	50.4	0.414	0.594
Azezo veterinary clinic	36	28.3	0.207	0.370
Hawariyaw veterinary clinic	27	21.3	0.145	0.294

Table 3 Percentage of Cases of Ruminal Disorders Treated and Drugs Utilized to Treat These Cases in the Three Veterinary Clinics in Gondar Town from January 1, 2015 to April 30, 2017

Drugs Utilized	Frequency (Cases Treated)	Cases Treated (%)	95% Confidence Interval	
			Lower	Upper
Indigestion powder	20	15.7	0.099	0.233
Liquid paraffin	4	3.1	0.009	0.079
Liquid paraffin and indigestion Powder	30	23.6	0.165	0.320
Antimicrobial	17	13.4	0.080	0.206
Indigestion powder and antimicrobial	31	24.4	0.172	0.328
Indigestion powder, antimicrobial and liquid paraffin	9	7.1	0.033	0.130
Liquid paraffin and antimicrobial	10	7.9	0.038	0.140
Indigestion powder, liquid paraffin and NaHCO ₃	6	4.7	0.018	0.100

Table 4 Percentage of Cases Treated and Drugs Utilized to Treat Ruminal Disorders in the Three Different Clinics

Drugs Utilized	Number and Percentage of Cases in Different Clinics							
	UOG		Azezo		Hawariyaw		Total	
	No.	%	No.	%	No.	%	No.	%
Indigestion powder	12	9.4	5	3.9	3	2.4	20	15.7
Liquid paraffin	2	1.6	1	0.8	1	0.8	4	3.1
Liquid paraffin and indigestion powder	16	12.6	8	6.3	6	4.7	30	23.6
Antimicrobial	2	1.6	6	4.7	9	7.1	17	13.4
Indigestion powder and Antimicrobial	19	15	7	5.5	5	3.9	31	24.4
Indigestion powder, antimicrobial and paraffin	6	4.7	2	1.6	1	0.8	9	7.1
Liquid paraffin and antimicrobial	3	2.4	5	3.9	2	1.6	10	7.9
Indigestion powder, paraffin and NaHCO ₃	4	3.1	2	1.6	0	0	6	4.7
Total	64	50.4	36	28.3	27	21.3	127	100

ruminants and the management system. Small ruminants require less food, and they are selective for quality feeds while cattle are non-selective feeders which eat everything they get and thus result in increased ruminal disorders.²¹

The rate of ruminal disorders was higher in adult animals than in young animals. This variation could be due to the difference in management system between the two age categories. Adults have more chance to be exposed to considerable feed changes and overfeeding of concentrates, which may result in indigestion. The lower rate of ruminal disorders in young animals could also be most likely due to the tradition of keeping young animals homestead than letting them travel some distance for grazing due to fears of wild predators. In addition, young animals are unable to walk long distances in search of grass.²²

The frequency of ruminal disorders had variation among clinics. The highest rate of ruminal disorders was seen at UOG veterinary clinic. This may be due to the

presence of different attitudes by the animal owners for different clinics because of a difference in terms of resource and manpower among the clinics.

The occurrence of ruminal disorders also varied by season and the highest proportion of these disorders were in winter and spring. This could be because of the variation in type, quality and quantity of ruminants' feed in different seasons. During winter ruminants may be forced to eat excessive quantities of relatively indigestible, poor-quality roughage like straw and bedding, or grain that can leads to disturbance in the rumen microenvironment.²³ The high rate of ruminal disorders in spring could be due to feed change as ruminants are exposed to growing lush pasture after being on a diet of dry feed.²⁴

In the present study, the high percentage of ruminal disorders were treated using a combination of drugs. This may be due to inadequate recognition of the disease, unavailability of diagnostic aids for confirmatory tests and the prescribers' belief of the better therapeutic efficacy of combined drugs.

All of the cases in the study area were diagnosed and treated using tentative diagnosis without getting definitive, laboratory supported diagnosis. In addition, 13.4% of the cases were treated using only antimicrobials. These reveal the presence of irrational drug utilization in the study clinics. This may be due to unavailability of diagnostic aids for confirmatory tests, inadequate recognition of the disease and absence of the right drug. The four main reasons of irrational drug utilization are inadequate recognition of the diseases or problems that lead to prescription of unnecessary or incorrect drugs, inappropriate choice of route, dose and duration.²⁵ Administration of most of the agents against ruminal disorder able to substantially change rumen pH and thus create a hostile environment for rumen microflora. Therefore, these compounds should only be administered to ruminants with a confirmed diagnosis of the specific disorder.⁸

Conclusion and Recommendations

The study revealed that ruminal disorders are the major challenges for livestock production in the study area. Acidosis, free gas and frothy bloat and simple indigestion were the major ruminal problems identified. The highest rate of ruminal disorders was seen in bovine from different animal species and in adult animals compared to young animals. The frequency of ruminal disorders also varied among clinics. The highest proportion of these disorders happened in the winter and spring seasons. All cases were diagnosed and treated empirically, without getting a definitive (laboratory-supported) diagnosis. Adequate diagnostic aids for confirmatory diagnosis should be available in the clinics. Accurate veterinary diagnosis must also be carried out before considering the use of drugs. In addition, awareness should be given to the community on animal husbandry and feeding management system. Furthermore, sufficient resources like drugs and manpower should be allocated to each clinic.

Ethical Approval and Consent to Participate

Ethical approval is not applicable. Verbal consent was obtained from these clinics before data collection.

Author Contributions

All authors made substantial contribution to conception and design, acquisition, analysis and interpretation of data; took part in drafting the article and revising it critically for

important intellectual content; agreed to submit the current journal; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

References

1. Tahir MB Determinants of livestock and feed water productivity in the mixed crop–livestock production system of debre berhan milkshed, central highlands of Ethiopia. PhD dissertation. Addis Ababa University, College of Veterinary Medicine and Agriculture Department of Animal Production Studies PhD Program in Animal Production. 2018.
2. Metaferia F, Cherenet T, Gelan A, et al. *A Review to Improve Estimation of Livestock Contribution to the National GDP*. Addis Ababa, Ethiopia: Ministry of Finance and Economic Development and Ministry of Agriculture; 2011.
3. PACE. Experiences and the way forward on community based animal health service delivery in Ethiopia. *Proc Workshop*. 2003;6.
4. Radostits OM, Blood CD, Gay CC. *Veterinary Medicine*. 9th ed. London: Bailliere, Tindall; 2000.
5. Radostits OM, Gay CC, Hinchcliff K, Constable PD. *Veterinary Medicine. A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs and Goats*. 10th ed. Saunders Elsevier; 2010.
6. Blood D,C, Radostits O,M. *Veterinary Medicine*. 7th ed. London, U. K.: Bailliere, Tindall; 1989.
7. Kimberling CV. *Jensen and Swift's Disease of Sheep*. 3rd ed. Philadelphia, U.S.A: Lea and febiger; 1988.
8. Boothe D,M, Jenkins W. Drugs affecting gastrointestinal function. In: Admas HR, editor. *Veterinary Pharmacology and Therapeutics*. 7th ed. Ames: Iowa State University press; 1995:1005–1027.
9. Teshome D. Prevalence of major skin diseases in ruminants and its associated risk factors at University of Gondar Veterinary Clinic, North West Ethiopia. *J Res Dev*. 2016;4(1):1–7.
10. Tesfaye A, Mengistu A, Rufael T, Muluneh A, Gizaw D. Sero-prevalence status of foot and mouth disease in the North Western Amhara Regional State, Ethiopia. *Ethiop Vet J*. 2016;20(2):43–53. doi:10.4314/evj.v20i1.4
11. Jemberu WT, Molla W, Almaw G, Alemu S, Rupprecht CE. Incidence of rabies in humans and domestic animals and people's awareness in North Gondar Zone, Ethiopia. *PLoS Negl Trop Dis*. 2013;7(5):e2216. doi:10.1371/journal.pntd.0002216
12. Dessie D, Menzir A. Temporal and spatial distribution of common bacterial livestock disease outbreaks in North Gondar, Ethiopia. *Int J Adv Res Pub*. 2017;1(3):57–61.
13. Fentie T, Fenta N, Leta S, et al. Sero-prevalence, risk factors and distribution of sheep and goat pox in Amhara Region, Ethiopia. *BMC Vet Res*. 2017;13(1):1–8. doi:10.1186/s12917-017-1312-0
14. MOA. Budgeting and planning report summery of MOA, north London zone. 2004.
15. CSA. Census central statics authority. Ethiopian agricultural enumerations. Result for Amhara region. 2007.
16. CSA North Gondar zone finance and economic development department annual statistical bulletin. 2008. 10–42.
17. Steele M. *The Tropical Agriculturist*. London: MACMILLAN education Ltd, ACCT; 1996:79–83.
18. Desta H. Estimation of weight and age of sheep and goats. Ethiopian sheep and goat productivity improvement program. American institute for goat research. *Tech Bull*. 2009;23:8–9.
19. Paris JA, Karisch BB. *Estimating Cattle Age Using Dentition*. Mississippi State University; 2013. MSUcares.com.

20. Osamah M. Acute carbohydrate engorgement of ruminants. *Med Lect*. 2016;1–10.
21. Nima M, Mohammad C. Review: a comparison between grazing behavior of cattle and sheep. *Global J Biodivers Sci Manag*. 2013;3(2):138–140.
22. Schwartzkopf-Genswein K, Beauchemin K, McAllister T, et al. *Ruminant Surgery*. 1st ed. New Delhi: CBS; 1993:199.
23. Erdman RA. Dietary buffering requirements of the lactating dairy cow: a review. *J Dairy Sci*. 1988;71:3246–3266. doi:10.3168/jds.S0022-0302(88)79930-0
24. Alemu Y, Sileshi Z. Ethiopia sheep and goat production improvement program. Bloat in sheep and goats; causes, prevention and treatment. *Tech Bull*. 2009;31:1–12.
25. Pallares R, Dick R, Wenzel RP, Adams JR, Nettleman MD. Trends in antimicrobial utilization at a tertiary teaching hospital during a 15-year period (1978–1992). *Infect Control Hosp Epidemiol*. 1993;14(7):376–382. doi:10.1086/646765

Veterinary Medicine: Research and Reports

Dovepress

Publish your work in this journal

Veterinary Medicine: Research and Reports is an international, peer-reviewed, open access journal publishing original research, case reports, editorials, reviews and commentaries on all areas of veterinary medicine. The manuscript management system is completely online

and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/veterinary-medicine-research-and-reports-journal>