Int.J.Curr.Microbiol.App.Sci (2024) *13*(05): 146-154

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 13 Number 5 (2024)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2024.1305.020

Knowledge, Attitude, and Practices of Livestock Owners toward Anthrax Disease in Gonji Kollela District, Amhara Regional State, Ethiopia

Genet Bezie*

Livestock and Fisheries Development Office, Gonji Kollela, Ethiopia

**Corresponding author*

Keywords

Anthrax disease, Attitude, Gonji, Knowledge, Practice

Article Info

Received:
20 March 2024
Accepted:
30 April 2024
Available Online:
10 May 2024

A B S T R A C T

Anthrax is the second most highly ranked zoonotic disease in Ethiopia due to its adverse consequences at the household level. It causes disease and production loss in livestock as well as severe disease in humans. So, a cross-sectional study was conducted from July to September 2022 in GonjiKollela district to assess and identify the knowledge, attitude, and practices of livestock owners toward anthrax. Ten kebeles were selected purposively based on accessibility. A semi-structured questionnaire was used to collect the data through face-to-face interviews. A total of 250 respondents participated in the survey study. About 70% of them knew the disease, anthrax, locally called "Quraba". Whereas the remaining 30% never heard about it. Regarding clinical signs, about 39 (15.6%), 37 (14.8%), and 36 (14.4%) of the respondents mentioned bleeding from natural body orifices, colic, and sudden death as a symptom of anthrax in animals respectively; while 38(15.2%) participants didn't know the signs of the disease. In humans, vomiting and diarrhea (31.6%), skin ulcer (28.8%), and sweating and increased body temperature (16.4%) were clinical signs of the disease. However, 23.2% of the respondents didn't recognize the clinical signs. Anthrax is an economically important disease and about 57 (22.8%), 56(22.4%), and 42(16.8%) respondents reported that death, treatment cost, and production loss were the major economic losses caused by anthrax respectively. In the area, burying (31.2%), and burning (30.8%) were the methods practiced to control and prevent anthrax but 19.2% of the respondents didn't know what to do. And, when their animals died from anthrax, 101(40.4%) buried, 55(22%) burnt, 45(18%) left on the ground, and 21(8.4%) skinned the dead carcass. Consumption of raw meat and contact with dead carcasses were the routes of transmission for anthrax. However, 31.2% of respondents disagree consumption of raw meat as a source of infection for human anthrax. And, about 42% of the respondents reported that anthrax isn't transmitted from animals to humans. The majority of the respondents (73.6%) didn't take any protective and control measures when their animals were affected by anthrax. Therefore, continuous awareness creation is required in the society to control and prevent the disease. Proper disposal of carcasses should be practiced. Regular vaccination of farm animals was also recommended.

Introduction

Anthrax is a zoonotic disease caused by the Gram-positive bacterium *Bacillus anthraces* (Fasanella *et al.,* 2010). It creates a bimodal lifecycle where the vegetative form is developed within the host and the spore form is developed in the environment. The spores can persist in the environment under unfavorable conditions for several years and initiate infection when favorable conditions are provided (Raymond *et al.,* 2010). Anthrax is found all over the world on all continents except Antarctica. It is common in parts of Africa, Asia, and the Middle East

where control measures in animals are inadequate. In Ethiopia, the disease is recognized by farmers as one of the most important livestock diseases (Gizaw *et al.,* 2020). And, it is ranked second only to rabies according to the recent joint-ministerial zoonotic disease prioritization exercise (Pieracci *et al.,* 2016). The disease affects almost all warm-blooded animals, including humans (WHO, 2008). It occurs in all food animals such as cattle, sheep, goats, and horses, which are susceptible to the organism. Pigs are more resistant than sheep and horses, whereas dogs and cats are relatively resistant and birds are highly resistant (Boron *et al.,* 2002).

The most important thing for the transmission of anthrax is the carcass of dead animals as it contains a large amount of *B. anthracis* organism. *B.anthracis* can infect animals directly from the soil or fodder grown on infected soil, contaminated bone meal or protein concentrates, infected excreta, blood, or other discharges from infected animals (Radostits *et al.,* 2007).

Pasture contaminated with anthrax spores is the most common source of infection for ruminants (Ndiva Mongoh *et al.,* 2008). Biting flies, mosquitoes, ticks, and other insects have often been found to harbor anthrax organisms. The most important disseminators of *B.anthracis* are scavengers like vulture birds, street dogs, and different wild carnivores (Hirsh *et al.,* 2003).

Human anthrax infection can occur through direct or indirect contact with infected animals or occupational exposure to infected or contaminated animal products like hides or wool, through skin contact, ingestion, and inhalation of spores (WHO, 2008; Egata and Baraki, 2018).

Clinical manifestations differ from species to species, presumably reflecting differences in susceptibility. Sudden death, bloody discharges from natural orifices (rectum, mouth, nostrils, etc.), rapid bloating of the carcass, absence or incomplete rigor mortis, and the absence of clotting of the blood are the common characteristics of anthrax in susceptible animals. In more resistant species, local signs such as swellings of the oral and pharyngeal regions are seen (Lista *et al.,* 2006).

The most effective way to avoid anthrax infections in both animals and humans is still vaccination (Shivachandra *et al.,* 2016). But, appropriate management practices are very important to control and prevent the disease. Adequate knowledge is essential for early recognition, detection, and notification of diseases. Good management and vaccination strategy are the major factors to set an appropriate control strategy against anthrax (Ndiva Mongoh *et al.,* 2008). The disease is the most serious and the second most highly prioritized zoonotic disease in the country but little is known about the community's awareness, attitudes, and practices regarding anthrax in the study area. This helps for a better understanding of the extent of knowledge among people and for guiding effective prevention and control measures against Anthrax disease. Therefore, the objective of this study was to assess the knowledge, attitude, and practice of the communities in GonjiKollela district towards Anthrax disease.

Materials and Methods

Study area

The study was conducted in GonjiKollela district which is one of the 105 districts of Amhara National Regional State of Ethiopia. It is part of the West Gojjam zone in the region. It is geographically located 11005' to 11020'N, 37020' to 37053'E, and within the altitudinal range of 1400-4300 meters above sea level. The district is bordered by four districts, namely YilmanaDensa in the North, DegaDamot in the South, Quarit in the West, and Bibugn in the East. Climatically, the GonjiKolella district falls into three climatic zones:high highland, midland, and lowland. The mean annual temperature level of the district ranges from 20°c - 30°c. It receives a mean annual rainfall of 1700 mm-2000 mm (Desta Horecha, 2005). It has a total population of 106,656 of which 53,669 are male and 52,987 are female (Central Statistical Agency, 2008). The dominant ethnic group of the district is Amhara and Amharic is the dominant language spoken in the area. The major livelihood of the people within the study district is a mixed crop-livestock system. From the livestock, ruminants have a major role in cash income and as a food source. In the study district, there is a free animal movement for marketing that favors disease transmission.

Study design and sampling methods

A cross-sectional survey study was conducted from July to September 2022 to assess the knowledge, attitude, and practice of livestock owners in the study area toward anthrax disease. Ten kebeles were selected out of 25 kebeles in the district.

They were selected purposively based on accessibility. Participant selection was conducted by kebele animal health practitioners. Equal numbers of household heads were selected from each kebele. Simple random sampling was used in selecting the individuals who come to get veterinary services in Kebele's veterinary clinics or animal health posts. A total of 250 households were included in this study.

A semi-structured questionnaire was prepared to collect the data through face-to-face interviews among the respondents. Ten animal health workers were recruited to collect the data. Before data collection started, adequate orientation and short training were given to the data collectors on anthrax and data collection procedures. The questionnaires were prepared both in English and Amharic languages. The questionnaire was pretested to check the understandability, and comprehension of the questions. Simultaneously, it was used as a part of the data collector training.

Data management and analysis

The collected data was coded and entered into Microsoft Excel spreadsheet and it was analyzed using IBM SPSS Statistics version 20 software. Descriptive statistics was used for data review.

Results and Discussion

Socio-economic characteristics of respondents

About 250 householders from ten kebeles in the district participated in the survey study. The socio-economic characteristics of the respondents are summarized in Table 1. The majority of the respondents were males (83.2%) and the rest were females with different age groups. Most of them were Orthodox Christians (85.2%). Their livelihood was based mainly on farming practices (84.4%) and there was a high level of illiteracy (58.4%) among the participants.

Species of animal owned

All households who participated in the study had animals. Many animal species were found in the surveyed households, including bovine, ovine, caprine, equine, and others (poultry and small animals). Among respondents, 124(49.6%), and 31(12.4%) had bovine and ovine respectively. It is presented in Figure 1 below.

Knowledge of respondents about anthrax

About 175 (70%) respondents knew the disease, Anthrax, locally called "Qurba". However, the rest 75 (30%) never heard about it. The typical source of information was through personal contact in society 72 (41.1%). It is indicated in Figure 2.

Regarding the cause of the disease, about 87(34.8%) of participants reported that Anthraxis caused by germs. But 58(23.20%) of them said that it is caused by starvation and heredity. While the remaining 105(42%) of the respondents didn't know.

About 145(58%) of the participants reported that anthrax could have been transmitted from animals to humans. However, the remaining 105 (42%) said that it doesn't transmit. Regarding modes of transmission, it is presented in Figure 3. About 16.4% of respondents didn't know the route of transmission.

Regarding the species of animals affected by anthrax, about 41(16.4%) respondents didn't know about it (Table 2).

Knowledge of respondents related to clinical symptoms of anthrax disease

From the total participants, about 79(31.6%), 72(28.8%), and 41(16.4%) reported that vomiting and diarrhea, skin ulcer, and others (sweating and increased body temperature) were clinical signs and symptoms of anthrax in humans respectively. It is indicated in Figure 4.

The majority of participants identified the symptoms of the disease in animals. And about 39(15.6%), 37 (14.8%), and 36(14.4%) participants reported that bleeding from orifice, shivering, and sudden death were symptoms of anthrax in animals. But about 38 (15.2%) respondents didn't know about it (Figure 5).

Knowledge related to control and economic impact of Anthrax

Control and prevention of the disease are essential in animal farming and for public health. And an important methods practiced among respondents were burying (31.2%), and burning (30.8%) the carcass, and about 18.8% of them practiced zero grazing, and avoiding raw

meat eating. It is presented in Table 3 below. About 149 (59.6%), and 125 (50%) respondents said that they took animals to the veterinary clinic and humans to hospital when they got infected by anthrax. However, 43 (17.2%), and 98 (32.2%) participants reported that they took their animals and family members respectively to traditional healers when they got infected by anthrax. Regarding the economic impact of Anthrax, 57 (22.8%), 56(22.4%), and 42(16.8%) respondents mentioned that death, treatment cost, and loss of production were the major negative impact of the disease respectively. Among participants, 101(40.4%), and 55(22%) buried and burnt died carcasses respectively when their animal died by anthrax; while 45(18%) of them left it on the ground, and 21(8.4%) skinned the dead carcass (Table 3).

The attitude of respondents related to Anthrax

Among participants, 43 (17.2%) strongly disagree, and 35 (14.0%) disagree about considering the consumption of raw meat as a source of infection for human anthrax. About 82(32.8%) respondents agree, and 62(27.2%) of them strongly agree that grazing at pasture may be a source of Anthrax infection for animals. Regarding medication, 52(20.8%) of participants strongly agree, and 29 (11.6%) agree that traditional healers are preferable to modern medicine for anthrax treatment. Among participants, 126(50.4%), and 82(32.8%) strongly agree that vaccination and burying of dead animals respectively could be important for the prevention and control of anthrax (Table 4).

The practice of respondents towards Anthrax

About 186 (74.4%) respondents vaccinated their animals but the rest didn't vaccinate. Regarding management practice, only 55(22%) respondents kept their animals indoors, while the remaining practiced the free grazing system. The majority of participants 184(73.6%) didn't take any protective and control measures when their animals were affected by anthrax (Table 5).

The present study revealed that the majority of the respondents were males (83.2%). This finding was higher than the report of Josephat *et al.,* (2021) in Kenya, 56% of the respondents were males. The difference can be attributed to the fact that females are less likely to be listed as household heads. The current study revealed that most of the respondents (58.4%) cannot read and write. This was higher than the study conducted in Bangladesh (Rahman *et al.,* 2020), who reported that 45.2% of the interviewees were illiterate. This may be due to the low attention given to modern education in Ethiopia.

The majority of households (70%) have information about anthrax. This finding was comparable with the report of Amare *et al.,* (2021) in the SodoZuria district, Ethiopia, where 74.6% of the participants had information about the disease. In this study, the main source of information about anthrax disease was from personal contact in the society (41.2%), but the least source was from radio (0.4%). However, other scholars from different parts of the world reported that respondents who got information from the radio were higher than those from society. Josephat *et al.,* (2021) from Kenya reported that the majority of respondents got information from radio (42%) and the rest got from society (22.6%) (Josephat *et al.,* 2021). Similarly, another scholar from Georgia reported that the source of information from radio (41%) was higher than from their society (11%) (Traxler *et al.,* 2019). The variation from this study may be due to the difference in education status, the place where the respondents live, and less awareness of social media in Ethiopian society.

In the present study, 34.8% of households believed that germs were the cause of the disease. This finding was lower than the report of Amare *et al.,* (2021) from SodoZuria district, 54% of the respondents believed that germs are the cause of Anthrax infection (Amare *et al.,* 2021). This variation may be due to differences in awareness of the society. In this study, 58% of the respondents knew that the disease can be transmitted from animal to human, while 42% said that the disease was not zoonotic. This result was higher than the study conducted in North Ethiopia, 15.8% of respondents reported that the disease is not zoonotic (Gebremedhin and Weldemelak, 2021). The difference may be due to the awareness difference of livestock owners.

In the current study, 24.8% of the respondents said that eating raw meat is considered as a source of infection for anthrax. This result was in agreement with a study conducted in Bangladesh, 25.5 % of the interviewees considered eating raw meat as a source of infection (Rahman *et al.,* 2020). In this study, 74.4% of the respondents have vaccinated their animals. The result was higher than the report of Gebremedhin and Weldemelak from Northern Ethiopia, only 4.4% of the respondents vaccinated their animals (Gebremedhin and Weldemelak, 2021). These may be due to the awareness differences of the society in different places.

Table.1 Socio-economic characteristics of respondents

Variable	Categories	Frequency (%)
Sex	Male	208(83.2%)
	Female	42(16.8%)
Age groups (in years)	18-32	101(40.4 %)
	33-46	124(49.8%)
	> 46	25(10%)
Education level of respondents	Primary school	53 (21.2%)
	Secondary school	29(11.6%)
	College	13(5.2%)
	University	9(3.6%)
	Illiterate	146 (58.4%)
Occupation	Farmer	211(84.4%)
	Merchant	15(6.0%)
	Unemployed	9(3.6%)
	Government employee	6(2.4%)
	House-wife	5(2.0%)
	Private employee	4(1.4%)
Religion	Orthodox Christian	213(85.2%)
	Muslim	37(14.8%)

Figure.1 Species of animals owned

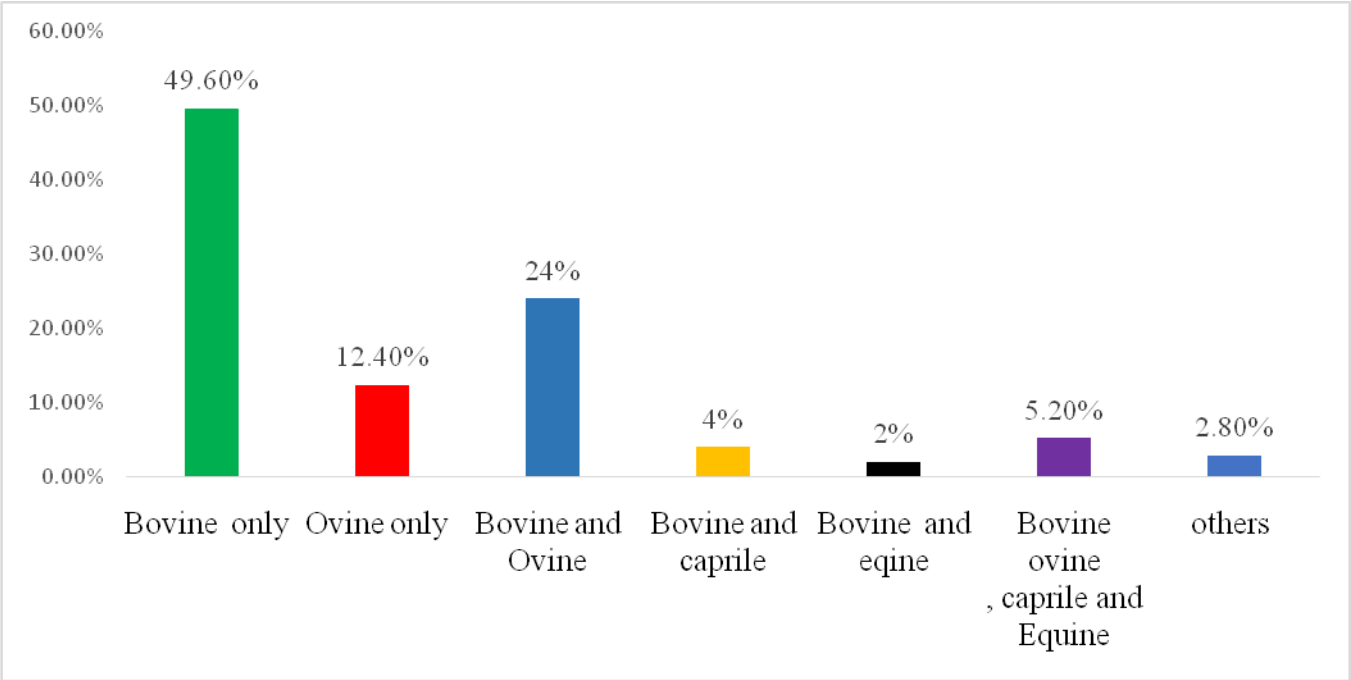


Table.2 Knowledge of respondents related to species affected

Variable	Categories	Frequency (%)
Which species of animal can be affected by anthrax?	Bovine	64(25.6%)
	Ovine	43(17.2%)
	Caprine	33(13.2%)
	Equine	32(12.8%)
	All	24(9.6%)
	I do not know	41(16.4%)
	Others	13(5.2%)

Table.3 Knowledge related to control and economic impact of Anthrax

Variable	Categories	Frequency (%)
What is the effect of anthrax on livestock?	Death	57(22.8%)
	Loss of production	42(16.8%)
	Treatment cost	56(22.4%)
	All	52(20.8%)
	Do not know	43(17.2%)
How could you control anthrax in your animal?	Bury carcass	78(31.2%)
	Burn carcass	77(30.8%)
	Do not know	48(19.2%)
	Others	47(18.8%)
Have you encountered anthrax infection on your farm?	Yes	57(38.8%)
	No	153(61.2%)
What actions did you take when your animal got infected by anthrax?	Took to the vet clinic	149(59.6%)
	Traditional healer	43(17.2%)
	Slaughter	27(10.8%)
	Others	31(12.4%)
If your animal died from anthrax what action do you take?	Buried the carcass	101(40.4%)
	Burn the died	55(22.0%)
	Skinning the died	21(8.4%)
	Left the ground	45(18.0%)
	Others	28(11.2%)
Has your family member ever been attacked by anthrax?	Yes	91(36.4%)
	No	159(63.6%)
What actions were taken when your family was attacked by anthrax?	Took to hospital	125(50.0%)
	Traditional healer	98(32.2%)
	Others	27(10.8%)

Figure.2 Source of information about anthrax

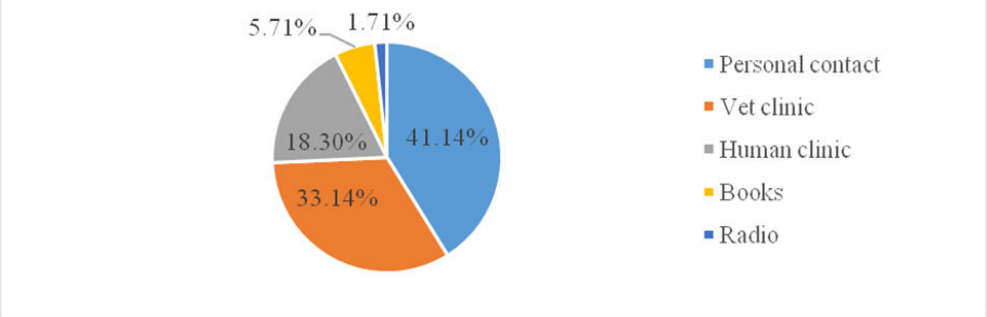


Table.4 The attitude of respondents related to Anthrax

Variables	Categories	Frequency (%)
Consumption of raw meat is a source of infection for human anthrax	Strongly agree	62(24.8%)
	Agree	69(27.6%)
	Uncertain	41(16.4%)
	Disagree	35(14.0%)
	Strongly disagree	43(17.2%)
Grazing pasture is a source of infection for animals	Strongly agree	62(27.2%)
	Agree	82(32.8%)
	Uncertain	44(17.6%)
	Disagree	22(8.8%)
	Strongly disagree	34(13.6%)
Traditional healers are more preferable than modern medicine for anthrax treatment	Strongly disagree	78(31.2%)
	Disagree	57(22.8%)
	Uncertain	34(13.6%)
	Agree	29(11.6%)
	Strongly agree	52(20.8%)
Anthrax can be prevented through vaccination	Strongly agree	126(50.4%)
	Agree	27(10.8%)
	Uncertain	36(14.4%)
	Disagree	23(9.2%)
	Strongly disagree	38(15.2%)
Anthrax can be controlled through buried dead animal	Strongly agree	82(32.8%)
	Agree	48(19.2%)
	Uncertain	39(15.6%)
	Disagree	36(14.4%)
	Strongly disagree	45(18.0%)

Table.5 Participants practice towards Anthrax

Variable	Categories	Frequency (%)
Do you use indoor management for your animal?	Yes	55(22.0%)
	No	195(78.0%)
Have you ever vaccinated your animals for Anthrax?	Yes	186(74.4%)
	No	64(25.6%)
Do you take any safety measures when you have anthrax suspected animal on your farm?	Yes	66(26.4%)
	No	184(73.6%)

Figure.3 Mode of transmission of Anthrax from animal to humans

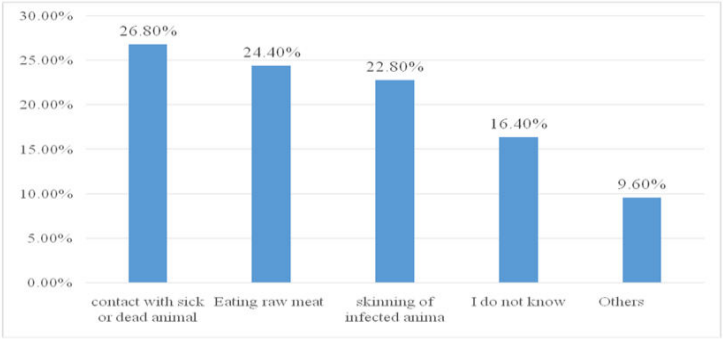


Figure.4 Knowledge of respondents related to symptoms of anthrax disease in human

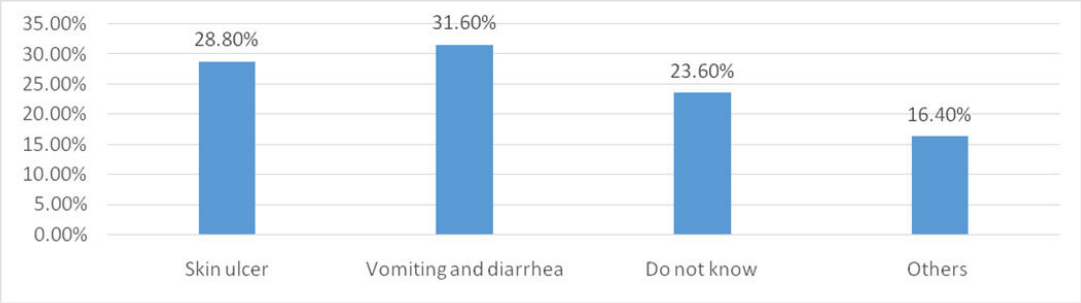
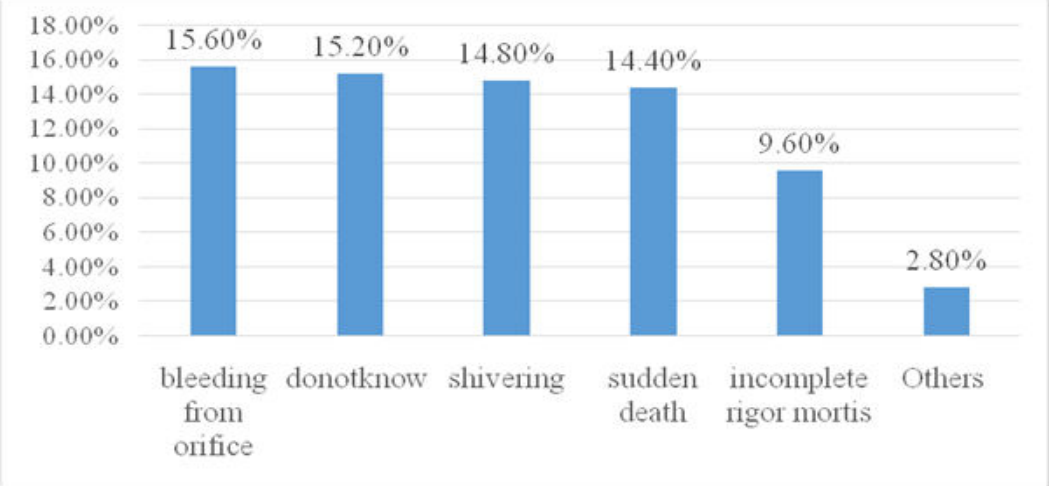


Figure.5 Knowledge related to symptoms of anthrax in animal



Author Contributions

GB proposed, designed, and executed the study. The author analyzed the data and interpreted it.

Acknowledgments

The author thanks the district animal health office workers for coordinating the interview and the householder farmers who participated in this study. Thanks to the Food and Agricultural Organization and Ministry of Agriculture for their support in actualizing this work.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

References

Amare, A. Liang, S. and Wan, C. (2021). Current Knowledge, Attitude, and Practices towards Anthrax Infection Prevention among Community Members and Professionals in Sodo Zuriya District of Wolaita Zone, Southern Ethiopia. *Journal of Zoonotic Diseases and Public Health.5:.410.*

Boron, E. J., Peterson R. and Finegold S. M., (2002). Diagnostic Microbiology. 9th edition, Bailey and Scot's, pp: 451-45

Central Statistical Agency (2008): Summary and Statistical Report of the Population and Housing Census Addis Ababa, Ethiopia.

Desta Horecha (2005). Inventory of Water supply schemes and Database management. Addis Ababa, Ethiopia.

Egata G., and Baraki N., (2018). Food Safety Practice and Associated Factors among Food Handlers in Public Food Establishments of Godey Town, Somali Region, Haramaya University, Eastern Ethiopia.

Fasanella, A., D. Galante, G. Garofolo and M. Hugh Jones, (2010). Anthrax undervalued zoonosis, Veterinary Microbiology, 140: 318-331. https://doi.org/10.1016/j.vetmic.2009.08.016

Gebremedhin R., and Weldemelak G., (2021). Knowledge, Attitude, and Practice towards Anthrax in Northern Ethiopia: A Mixed Approach Study https://doi.org/10.21203/rs.3.rs-33998/v3.

Gizaw S, Desta H, Alemu B, Tegegne A, Wieland B. (2020). Importance of livestock diseases identified using participatory epidemiology in the highlands of Ethiopia. Trop Anim Health Prod.; *52(4)*:1745–57. https://doi.org/10.1007/s11250-019-02187-4

Hirsh, D. C., Zee Y. C., and Souza C. A., (2003). Veterinary microbiology. USA: Black well Science, pp: 148-180

Josephat Mutiso Mbai, Jack Owiti Omolo, Dominic Wamamba, Daniel Maritim, Zeinab Gura, Mark Obonyo. (2021). Assessment of knowledge, attitudes, and practices towards anthrax in Narok County, Southern Kenya.

Lista F, Faggioni G, Valjevac S, Ciammaruconi A, Vaissaire J, le Doujet C., (2006). Genotyping of *Bacillus anthracis* strains based on automated capillary 25-loci multiple-locus variable-number tandem repeats analysis. BMC Microbiol.; 6: 33. https://doi.org/10.1186/1471-2180-6-33

Ndiva Mongoh M, Dyer N, Stoltenow C, Hearne R, Khaitsa M, (2008). A review of management practices for the control of anthrax in animals. The 2005 anthrax epizootic in North Dakota–case study. Zoonoses Public Health., 55(6):279–90. https://doi.org/10.1111/j.1863-2378.2008.01135.x

Pieracci E G, Hall A J, Gharpure R, Haile A, Walelign E, Deressa A, (2016). Prioritizing zoonotic diseases in Ethiopia using a One Health approach. One Health. 2:131–5. https://doi.org/10.1016/j.onehlt.2016.09.001 PMID: 28220151

Radostits, O. M., C. C. Gay, K. W. Hinchcliff and P. D. Constable, (2007). A textbook of the diseases of cattle, horses, sheep, pigs, and goats. Veterinary Medicine, 10: 2045-2050

Rahman M M, Hossain M S, Haque M S, Nabi M R, Morshed M G and Ahsan G U (2020). Knowledge and attitude towards anthrax at the anthrax belt Sirajgonj district in Bangladesh. *J. Vet. Med. OH Res.* 2 (2): 417-426 https://doi.org/10.36111/jvmohr.2020.2(2).0023

Raymond, B., Wyres, K. L., Sheppard, S. K., Ellis, R. J., and Bonsall, M. B. (2010). Environmental factors determining the epidemiology and population genetic structure of the *Bacillus cereus* group in the field. *PLoSPathogen*, *6*(5), e1000905. https://doi.org/10.1371/journal.ppat.1000905

Shivachandra S B, Chnda M M, Reddy G B M, Hemadri D., (2016). Anthrax at a glance. Bengaluru Karanataka. ICAR-national institute of veterinary Epidemiology and disease Informatics (NIVEDI). 2016.

Traxler R M, Napetvaridze T, Asanishvili Z, Geleishvili M, Rukhadze K, Maghlakelidze G, *et al.,* (2019) Knowledge, attitudes, and practices related to anthrax and animal care: A case-control study in Georgia. PLoSONE14(10):e0224176. https://doi.org/10.1371/journal.pone6

World Health Organization (2008). Anthrax in humans and animals - 4thed. Geneva, Switzerland:

How to cite this article:

Genet Bezie. 2024. Knowledge, Attitude, and Practices of Livestock Owners toward Anthrax Disease in GonjiKollela District, Amhara Regional State, Ethiopia. *Int.J.Curr.Microbiol.App.Sci.* 13(5): 146-154.
doi: https://doi.org/10.20546/ijcmas.2024.1305.020