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Assessment of Farmers' Knowledge and Control Practices in Ticks in Gondar Zuria and Lay Armachiho Districts of Amhara Region, Northwest Ethiopia

Fikirte Gebrie Chekol*

Livestock and Fisheries Resources Office, Central Gondar zone, Amhara Region, Northwest Ethiopia.

***Corresponding Author(s): Fikirte Gebrie Chekol**

Livestock Resources and Development Office Central Gondar zone, Amhara Region, Northwest Ethiopia.

Tel: +251962796999; Email: fiirte2016@gmail.com

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Abstract

Ticks are very significant and harmful blood sucking external parasites of mammals, birds and reptiles throughout the world. It has a considerable impact on animals either by inflecting direct damage or by transmission of tick-borne pathogens. A cross-sectional study was conducted from January 2025 to March 2026 in Gondar Zuria and Lay Armachiho districts of Amhara Region, Northwest Ethiopia with the objectives to assess farmers' knowledge and control practices towards tick in cattle. A total of 120 farmers were participated in the questionnaire survey. Majority of the study farmers have good knowledge and practices, recognized the effect of ticks on animal health and production and take different control measures such as manual removal and application of acaricides. In conclusion, tick and tick-borne hemoparasites are one of the most important cattle diseases in the study area. However, their knowledge to specific tick-borne hemoparasites was limited. Tick control intervention is recommended in the study area to minimize the occurrence of tick-borne hemoparasites and associated livestock production losses.

Introduction

Background

Ethiopia has an extremely diverse topography, a variety climatic features and agro ecological zones that are expedient to host a very large animal population [1]. It has the largest livestock population in Africa with an estimate of 78 million cattle, 42.9 million sheep, 52.5 million goats, 2.11 million horses, 0.38 million mules, 8.98 million donkeys, 8.1 million camels and 57 million of poultry [2].

Livestock sub sector plays vital roles in national economy like in generating income to farmers, creating job opportunities, ensuring food security, providing services, contributing to asset, social, cultural and environmental values, and sustain livelihoods but its development is hampered by different constraints [3]. The most important constraints to cattle productions are widespread endemic diseases including parasitic infestation, poor veterinary service and lack of attention from government [1].

Ectoparasite is widespread and the most important prevalent constraints to the livestock sector that affect the production and productivity of cattle [4,5]. Ticks are very significant and harmful blood sucking external parasites of mammals, birds and reptiles throughout the world [6]. It has a considerable impact on animals either by inflecting direct damage or by transmission of tick-borne pathogens [7]. Tick and tick born disease affect 90% of the world's cattle population and are widely distributed throughout the world [8]. The country's environmental condition and vegetation are highly conducive for ticks and tick-borne disease perpetuation [9]. Ticks are more prevalent in the warmer climates, especially in tropical and subtropical areas [10].

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Tick distribution and their population in the country vary according to their adaptability to ecology, eco-climate, microhabitats, ambient temperature, rainfall and relative humidity which is critical factors affecting life cycle of ticks [7]. Ticks comprise various types of genera, including Amblyomma, Rhipicephalus, Haemaphysalis, Hyalomma and Rhipicephalus (Boophilus). The genus Amblyomma and Rhipicephalus (Boophilus) are predominating in many parts of country [11]. The life of ticks depends on the host animal which results in retardation to animal growth, loss of milk and meat production.

Generally, ticks could be affecting the market price and decreasing the annual income of humans [12]. In Ethiopia, ticks in cattle population cause serious economic loss to smallholder farmers, the tanning industry and the country as a whole through the mortality of infected animals, decreased production, down grading and rejection of hide [13]. The effects of ticks estimated annual loss of US$ 500,000 from hide and skin downgrading and approximately 65.5% of major defects of hides in Eastern Ethiopia [14].

Various Tick prevalence studies have been conducted in different localities of Ethiopia. The prevalence of ticks in different studies has shown a range of 23-85%. In the study area, information is scarce as there have not been any epidemiological studies conducted on ticks in cattle. Therefore, this study was initiated to generate baseline information on the epidemiology of tick in cattle for developing disease control and prevention programs. It also expected to guide community-based awareness programs about ticks in the study area to improve effective tick prevention and control measures in cattle.

Statement of the problem

Tick infestations in cattle are economically important ectoparasite and cause a major impediment to the health and productive performance of cattle in tropical and subtropical area [25]. This disease causes economic loss towards livestock production and has a negative impact on food security, animal product and by products [16]. In Ethiopia, ticks and tick-borne diseases in cattle population cause serious economic loss to smallholder farmers, the tanning industry and the country as a whole through the mortality of infected animals, decreased production, down grading and rejection of hide [13]. In addition, the influence of livestock farming practices on the spread and maintenance of ticks in cattle is poorly understood [17].

Despite the widespread distribution of various tick species across the study area little is known about the spread of harmful hemoparasite carried by ticks. Thus, there is paucity of information on tick in Lay Armachiho. In order to address the above problems, a study is required to fill the gaps in knowledge about the disease and its vectors in order to create baseline information that can be used to develop efficient disease control and prevention program. So, because of these problems the following research questions are formulated.

Research questions

This research work was attempted to answer the following research questions.

- ✓ What is the level of farmers' knowledge and control practices towards tick and tick-borne hemoparasites in cattle?

Objectives

General objective

- ➢ The aim of this study was to assess farmers' knowledge and control practices towards tick in cattle in Gondar Zuria and Lay Armachiho districts of Amhara region, Northwest Ethiopia.

Specific objectives

The specific objectives of this study are:

- To measure the level of farmers' knowledge and control practices towards ticks in cattle.

Significance of the study

This study would be used to measure the level of farmers' knowledge and control practices towards ticks in cattle in the study area. To update the required bodies about the important risk factors responsible for the occurrence of ticks in cattle. The study would be promoted to future researchers to use the gap for further investigating the occurrence of this ectoparasite in cattle in the study area and bordering districts. Therefore, this study would facilitate zonal and regional animal health sectors used to designing and implementing effective control and prevention strategies of ticks in cattle.

Materials and methods

Study area

The study was conducted in Gondar Zuria and Lay Armachiho districts in Amhara region, Northwest Ethiopia from January 2024 to March 2026. The two administrative zones were selected purposively based on their livestock population agro ecology representation and accessibility.

Gondar Zuria is one of the districts in the North Gondar Zone of the Amhara region of Ethiopia. It has latitude and longitude of 12°36'N and 37°28'E and an altitude range from 1800- 2700 meters above sea level. Makesignit town is the administrative center of the district. Topography of the district's area is 65% flat land, 25% hill and 10% valley type. Gondar Zuria'sarea coverage 63% is for cropland, 14.8% grass land, and 9.6% is covered with forest, 7.5% is taken by physical constructions, 2.6% of is regarded as wasteland and 2.5% for other. Based on traditional agro-ecological classification, *Gondar Zuria* is described as 221 % *Dega* and 78% *Weyna Dega*. The annual average rainfall of the district ranges from 950 to 1035 mm. The district has a total of 114,983 area coverage in hectare. The temperature and rainfall ranges between 24-35°C and 950-10-33 mm, respectively. Livestock populations in the district were 245,499 cattle, 93,200 sheep, 100,101 goats, 221,913 chickens, 6,497 horses, 940 mules and 32,026 donkeys (GZLRDO, 2025). The human population of the district is estimated to be 271,056 (138,248 males and 132,808 females).

Lay Armachiho district is found in Central Gondar zone with an area of 1,059.33 square kilometers. It is located in Central Gondar zone, Amhara regional state, Northwest Ethiopia, located at latitude of 13° north and longitude of 37.2° east at an altitude range from 1,500-2,700 meters above sea level. The administrative center of the district is Tikel Dingay, with 29 rural and two town administrative units/kebeles. The agro climatic zone of the area is characterized as highland (7%), midland, (61%) and lowland (32%) with the temperature and rainfall ranges between 18-30°C and 800-1,500 mm, respectively.

It is located 749 kilo-meters away from Addis Ababa, the capital city of the country, and 207 kilo-meters away from Bahir Dar, the capital city of the region [19]. The livestock populations of the district were 456,522 (cattle 145,733, sheep 40,917, goats 72,247, horses 330, mules 295, donkeys 20,219 and poultry 197,000) [20]. A total human population of a district estimated to be 157,836, of whom 79,538 were males and 78,298 females.

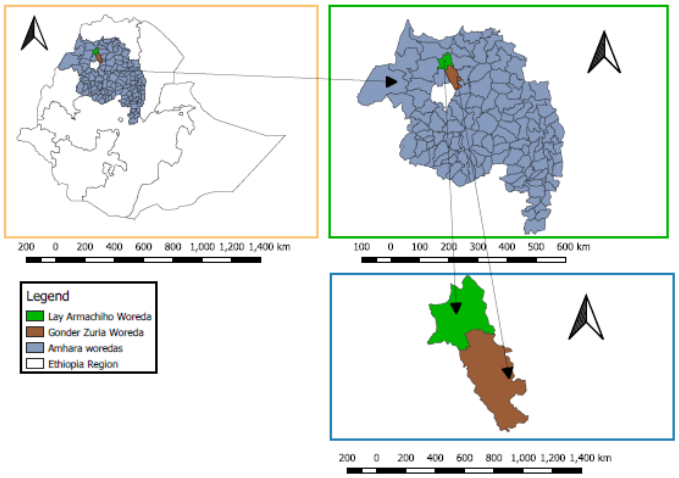

Figure 1: Maps of the study area.
Sources: QGIS software version 3.22

Study population

The study included both sexes, participants who were at least 18 years old and those who had lived in the area for six months or more.

Study design

A cross-sectional study was conducted from January 2025 to March 2026 using a semi-structured questionnaire. The questionnaire was designed to collect quantitative data to assess farmers' knowledge and control practices towards tick in cattle (Annex 1).

The questionnaire had 4 sections such as socio demographic characteristics, knowledge, attitude and practices of respondents regarding on tick infestation in cattle. Depending on the option of each questionnaire sections in related questions about knowledge and practice, respondents were asked to answer 'yes' or 'no' or to choose from a list of options provided. Attitude questions were developed by Likert's scale having five components, strongly disagree, disagree, uncertain, agree and strongly agree.

The socio-demographic questions included were respondents' sex, age, socioeconomic status, marital status and educational status. Age class of the respondents was classified to three groups as less than 30 years, 30 to 45 years and greater than 45 years following previous recommendations for social science research [24]. Before collecting the actual data, it was pre-tested and corrected based on the feedback of pre-test. The pilot testing was primarily targeted to test clarity of questions, to estimate the time needed to administer the questions and enough to acquire the required information. The final questionnaire was administered by face-to-face interviews using the local language (Amharic). The selected respondents were individually interviewed using questionnaire. Both open and closed ended questions were included in the questionnaire.

Sample size determination and sampling method

Based on the formula given by Arsham [22] for questionnaire surveys, a total of 100 farmers were selected by simple random sampling and interviewed from both districts.

$$n = \frac{0.25}{SE^2}$$

Where: n=sample size, SE=Standard Error assuming the standard error of 5% and 95% confidence interval. However, to increase the precision 120 farmers were selected and interviewed from the study districts. So, from this 60 farmers from Gondar Zuria and 60 farmers from Lay Armachio districts were selected and interviewed respectively.

Questionnaire survey

The questionnaires were prepared in English and were translated into local language (Amharic) and re-translated to English language. A semi-structured questionnaire was developed to gather information regarding the possible risk factors including age, sex, body condition and Herd size. Before collecting the actual data, it was pre-tested and corrected based on the feedback of pre-test. The selected farmers were individually interviewed using questionnaire. Both open and closed ended questions were included in the questionnaire administered to the randomly selected cattle owners by face to face interview in order to have basic information about cattle management, composition of the herd, perception about tick and tick-borne hemoparasites and practices to control tick-borne hemoparasites.

Data analysis

The collected data was entered into Microsoft Excel, coded and summarized using descriptive statistics. The socio-demographic questions were included respondents' sex, age, marital status, religion and educational status. Age class of the respondents was classified to three groups as less than 30 years, 30–45 years and greater than 45 years following previous recommendations for social science research [24].

Respondents who scored yes and/correct responses were considered as having adequate knowledge and those who scored no and/ incorrect responses were considered as having inadequate knowledge. Similarly, respondents who scored yes and/correct responses were categorized as having good practice and individuals scored no and/ incorrect responses as having poor practice. The attitude questions were set in Likert scale and were scored as 1=strongly disagree, 2=disagree, 3=uncertain, 4=agree and 5=strongly agree which depends on the nature of the statement. A farmers attitude was determined good attitude as a proportion of agree and strongly agree greater than or equal 50%, poor attitude as a proportion of disagree and strongly disagree less than 50% and neutral attitude based on the scores by respondents given for questions measuring attitude by Likert scale.

Results

Socio-demographic characteristics of the respondents

Majority of respondents (90%) in the study area were males, and 65% were aged >45 years old. More than two third of the respondents (85%) were married and 66.7% had illiterate. Besides, 100% of the study respondents were full time farmers and most of the respondents were Orthodox Christians. All (100%) of the respondents were used to reared livestock for different agricultural purposes (Table 1).

Table 1: Socio-demographic characteristics of the respondents.

Variables	Categories	Lay Armachiho	Gondar Zuria	Total
Sex	Male	56 (93.3%)	52 (86.7%)	108 (90%)
	Female	4 (6.7%)	8 (13.3%)	12 (10%)
Age group	>45	42 (70%)	36 (60%)	78 (65%)
	30-45	15 (25%)	21 (35%)	36 (30%)
	<30	3 (5%)	3 (5%)	6 (5%)
Level of educated	Illiterate	38 (63.3%)	42 (70%)	80 (66. 7%)
	Basic educate	12 (20%)	10 (16.67%)	22 (18.3%)
	Elementary	7 (11.7%)	5 (8.33%)	12 (10%)
	High school	3 (5%)	3 (5%)	6 (5%)
Marital status	Married	51 (85%)	51 (85%)	102 (85%)
	Single	2 (3.3%)	4 (6.7%)	6 (5%)
	Divorce	4 (6.7%)	5 (8.3%)	9 (7.5%)
	Windowed	3 (5%)	0 (0%)	3 (2.5%)
Religion	Orthodox	60 (100%)	60 (100%)	120 (100%)

Assessment on knowledge and practice of farmers towards tick and tick-borne hemoparasites in cattle

About 71.7% of the participants perceived that tick's observation on different body parts of cattle. Regarding predilection site of ticks, 80% of respondents knew groin and udders are the most tick attachment sites followed by chest and axillae and dewlap with a proportion of 44.5% and 42.5%, respectively. About 34.2% of the participants reflected that tick causes production loss and 55.8% of them perceived that during wet season the tick burden is higher than dry season. Regarding control measures, about 45% of the participants practiced manual tick removal, 37.5% use acaricides and 25% take animals to the health center to control tick and tick-borne hemoparasites, respectively (Table 2).

Attitudes of respondents towards tick and tick-borne hemoparasites

Over 76% of the participants perceived as tick and tick-borne hemoparasites can cause health and production loss in cattle. Over 80% of the participants were agreed that treatment (ivermectin) can reduce the effects of tick in cattle. About 60% of the respondents were agreed with that using veterinary drugs is more effective than other tick control measures (traditional medicine, manual tick removal, spraying roach killer) etc. (Table 3).

Table 2: Assessment on knowledge and practices of farmers towards tick and tick-borne hemoparasites in cattle

Variables	Category	Proportion (%)
Tick observation on cattle bodies	Yes	86 (71.7)
	No	34 (28.3))
Season of high ticks infestation	Wet	67 (55.8)
	Dry	32(26.7)
	Bothseason	21(17.5)
Role of ticks in disease transmission	Yes	86(71.7)
	No	34(28.3)
	Don'tknow	0(0)
Tick attachment sites	Groin and udder	96 (80)
	Dewlap	51(42.5)
	Chest and axillae	53 (44.2)
	Anus&perianalregion	7(5.8)
	Other (limb,ear,feetetc.)	12(10)
Use communal grazing and watering point	Yes	108 (90)
	No	12 (10)
Effects of tick infestation	Production loss (meat and milk)	41 (34.2)
	Teat blinding	38 (31.7)
	Skin damage	20 (16.7)
	Lameness	3 (2.5)
	Weakness	4 (3.3)
	Death of animals	19 (15.8)
Purposes for visiting veterinary health clinic	To receivemedicinesforsickanimals	96(80)
	To receivedewormingdrugs	84(70)
	to receiveacaricides	107(89.2)
	Get adviceonhealthofanimals	6(5)
Common clinical signs observed	Fever	63 (52.5)
	Weakness	52 (43.3)
	Anorexia	13 (10.8)
	Red or brown color urine	14 (11.7)
	Loss of production	45 (37.5)
	Emaciation	52 (43.3)
	Rough hair coat	39 (32.5)
	Don't know	23 (19.2)
Tick control measures applied	Takeanimalstothe veterinary healthclinic	30(25)
	Use traditionalmedicine	7(5.8)
	Spraying acaricides	45(37.5)
	Spraying roachkiller	24(20)
	Manual tickremoval	54(45)
	Nothing done	5(4.2)

Table 2: Summary of respondents for attitude questions.

Attitude Questions	Response categories n(%)						
	Negative attitude		Proportion (%)	Uncertain	Positive attitude		Proportion (%)
	Strongly disagree	Disagree			Agree	Strongly Agree	
Tick cause health and production loss	6(5)	11(9.2)	17(14.2)	11(9.2)	42(35)	50(41.2)	92(76.6)
Treatment (e.g. ivermectin) reduces effects of tick	2(1.7)	11(9.2)	13(10.8)	10(8.3)	48(40)	49(40.8)	97(80.8)
Good animal husbandry practices to minimize T&TBH	18(15)	22(18.3)	40(33.3)	6(5)	46(38.3)	28(23.3)	74(61.7)
Cattle's away from CGA & CWPs can reduce Tick transmissions	6(5)	23(19.2)	29(24.2)	13(10.8)	40(33.3)	38(31.2)	78(65)
Using veterinary drugs are better than other tick control measures.	18(15)	20(16.7)	38(31.7)	10(8.3)	31(25.8)	41(34.2)	72(60)

T&TBH: Tick and Tick Borne Hemoparasite; CGA: Communal Grazing Land; CWPs: Communal Watering Points.

Discussion

In KAP study, most of (71.7%) the respondents reported their frequent observation of ticks on different body parts of cattle. This is the reason that the respondents were farmers whose lives are intimately linked with animals, pastures, and forests, where observing ticks that are commonly affect different body parts of cattle. More than half of the respondents (55.8%) having observed ticks in wet season while, 26.7% and 17.5% of the respondents were ticks observed in dry and both seasons. This is due to the seasonal variations within a bioclimatic zone may favour or hinder the development or activity of a tick species during certain periods (Asebe *et al*. 2016). The dry season results in lower relative humidity and higher environmental temperature which influences the mortality of ticks due to desiccation [7].

Majority of the present study participants (80%) recognized groin and udders was the most predilection site for tick attachments but less frequently to chest and axillae, dewlap, other (limb, ear, feet etc,) and anus and perianal region. This is due to ticks need smooth body parts to attached the host. About 71.7% of the respondents knewas cattle get disease from ticks, they recognized as ticks may transmit diseases to cattle while biting or sucking the blood from cattle.

In the study area, about 90% of the farmers share communal grazing area and watering points which is favorable for tick's transmission to animals. This is due to large number of animals are grazing and drinking together in which ticks are transmitted from infested animals to non- infested animals.

Production loss, teat blinding and skin damages were perceived to be the three most important effects of tick infestation with the proportion of 34.2%, 31.7% and 16.7% respectively. This effect of tick observed due to regular unavailability of acaricides access from any livestock health center and attributed to poor cattle management system of farmers,so effects of tick infestation is higher. In similar KAP studies conducted by Rehman *et al*. [25] in Tanzania and Adehan *et al*. [26] in Benin, where farmers had to bear the cost of acaricides, tick infestation and TBDs were considered a major problem in livestock rearing. However, the farmers are got an availability of acaricides and used as and when required, and the subsequent application to the animals would remove ticks present on cattle. Therefore, it is possible that they might have never perceived tick infestation as an important animal health effect.

Among the most important purposes visit the veterinary health clinic related to tick and tick-borne diseases, 89.2% of the respondents were to get acaricides for controlling tick infestation in cattle, where as 80%, 70% and 5% of respondents were visiting veterinary health clinic as to receive medicine for sick animals, deworming drugs and get advice for health of animals. However, farmers are got an access of acaricides supply and other veterinary drugs as and when required in the veterinary health clinic and the subsequent application to the animals would remove ticks present on cattle and other infections of cattle.

In this study, most of (52.5%) the respondents reported that a clinical sign of fever observed due to tick borne hemoparasite infection in cattle, but there were some respondents who reported weakness, production loss, emaciation, rough hair coat, red or brown color urine. Generally, it indicates that the majority of farmers could not identify a typical clinical sign of tick-borne hemoparasite infections in cattle.

About 60% to 80%, of the study farmers recognized as controlling ticks and tick-borne hemoparasites by taking sick animals to the health center for treatment, as a cause of health and production loss, keeping cattle away from communal area, applying good animal husbandry practice, and veterinary drugs are better than other control measures towards in the prevention and control of tick- and tick-borne diseases in cattle respectively. However, a farmer's knowledge, beliefs, emotions, and values, are closely interlinked with attitudes, which can either be positive or negative by Launiala [27].

Conclusion and recommendations

With regard to the knowledge and control practice majority of cattle owners were farmers and used to reared livestock for different agricultural purposes. Currently low level of awareness or knowledge of livestock owners about the tick-borne hemoparasites which transmitted by ticks in the study area. In conclusion, tick and tick-borne hemoparasites are one of the most important cattle diseases in the study area.

Based on the above conclusions the following recommendations are forwarded;

- Strategic tick control measures should be carried out mainly during season of high tick occurrence in order to minimize losses attributed to ticks in the area.
- Knowledge on tick-borne hemoparasites of cattle seems low among the farmers hence cattle owners should be made aware of harmful effect of the ticks and TBD through training.
- The economic impact and effects of ticks on cattle productivity should be further studied at zonal and regional level.
- Further research works on molecular level should be carried out.

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