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Research Article

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Assessment on The Occurrence of Tick Infestation on Camel and Cattle with Associated Factor by Implementing Participatory, Conventional Investigation in Selected Pastoral Areas of Oromia Region, Ethiopia

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Abstract

The study was conducted in 2023 G.C in Oromiya Regional State, Kumbi and Gola oda woreda to identify the prevalence, density and strategic control of tick's infestation on camel and cattle with risk factors. Data collected by using pre-testing questionnaires, focus group discussions, retrospective data from woredas and observation of infrastructure with 900 sample.The results showed that the prevalence and density of Gola oda higher than Kumbi woreda with rankings ticks species from higher prevalence to lower prevalence : Rhipicephalus pulchellus (48.9%), Amblyomma gemma (26.3%), Hyalomma truncatum (11.6%), Amblyomma lepidum (6.7%), and Amblyomma variegatum (6.5%) respectively. The variables considered; origin, age, body condition and season of the years were significant risk factors. Tick density and tick burden with the highest mean tick density were wet season and high tick burden in spring season.Fulfilling necessary requirements strategic control for each woredas awernas creation of farmers and increase capacity building of Veterinary services delivery system in both woreda.

keywords: Prevalence, Density, Risk Factor, Management, Investigation

1.Introduction

Camels and cattle are suppressing role in adding a stability of food security, farming systems transporting systems with sustained different environmental challenges and priority of milk and meat production sales for savings income in pastoral areas [1,2]. Ticks (Ixodoidea) are the most prevalent ectoparasites that infect livestock and transmit varies diseases as vectors such as babesiosis, anaplasmosis, heartwater, and Lyme disease with detrimental impact on quality and quantity of livestock products. They are classified based on the number of hosts required for completing their life cycle. Ticks infestation can lead to slow growth rates, decreased milk output, and even mortality. As well as by losing quality of hide and skins impacts on exports [3,4]. Hard ticks are vectors of harmful pathogens of rickettsia,bacterial, viral, and protozoan origin, which cause serious infectious diseases in humans and livestock [5]. Tick-borne diseases are the most significant constraints on livestock production systems in Ethiopia [6]. In Ethiopia, ruminant ectoparasites are responsible for significant financial losses by decreasing quantity and quality production as well as international markets rejection of hides. Due to this reason ticks are the most economically significfor livestock in particularly in sub-Saharan African continent [7]. The most common tick genera in Ethiopia are Amblyomma and Boophilus, followed by Haemaphysalis, Hyalomma, and Rhipicephalus [8].

African pastoral communities in Africa live in some of the least developed and harish environments in the world. Livestock herding contributes significantly to the social and economic well-being of these communities [9]. Communities in the pastoral area rely heavily on camels and cattle for their livelihoods, and the area is characterized by the extensive grazing of livestock in communal ranges. Owing to repetitive cycles of drought, transhumance has been adopted as a coping strategy for survival. In the rainy season, livestock is kept in enclosures located closer to the permanent settlement area; however, in search of pastures and water during the dry season, pastoralists move their livestock to nearby areas and countries [10]. Additionally, insufficient veterinary services and social awareness self-treating without any animal health profession. Thus, develop drugs resistivity on animals and impacts of human by drug residue. More over due This study was

determining the prevalence and density of ticks in camels and cattle raised in the pastoral areas of the eatrn Oromiya and improve strategic control by improvement of animal health service in the study districts.

2. Description of Study Area

The study was conducted in kumbi and Gola oda, districts of Oromiya Region, Ethiopia. It is located about 814 ,707 km far East of Addis Ababa respectively. The altitude varies from 880- 1900 abd 2000- 3500 m.a.s. Respectively The area experience mean annual temperature are 16 and 28°C, respectively. Total livestock population in these districts during the study period were Cattle 506678 Sheep 240238 Goat 391444 Poultry 4488 Equine 29152, camels 231857 and Bee hive 4540 [CSA 11].

3. Data collection methodology

Questionnaire survey, focus group discussion, retrospective data and observations were conducted to collect data. Semi-structured questionnaire was designed and veterinarians were interviewed. Pilling tools was used to estimate the incidence of common ectoparasites in cattle and camels in Kumbi and Gola oda districts. A circle was drawn on the flip chart representing each disease, and the participants allocated 100 counters (beans, maize seeds) to each circle according to their relative importance and occurrence [16]. A seasonal calendar was used to describe the seasonal variation in the prevalence and importance of the key ectoparasites. Focus group discussion was conducted at each selected peasant associations farmers according information from key informant was used to select participants and peasant associations (PAs) [18].

Each focus group discussion was composed of 24 discussants. A checklist (based on standards set by the regional bureau of agriculture) was prepared and both private and government animal healt service delivery centers operating during the study period was observed for all available premises and facilities formed from 8 peasant associations these districts, selected purposively based on information from a key informant discussion a such as semi structured. Respondents were asked to name and describe common ectoparasites affecting camels and cattle in their area, as well as the circumstances under using the local language of that area. The objective of the study was to determine the prevalence and density of ticks in camels and cattle establish strategic control measures to enhance livestock production in pastoral areas piling, and seasonal calendars, were used to collect data [19–21].

3. Study Animal and Study Design

The study animals were indigenous cattle (Bos indicus) also known as cattle and camels (Camelus dromedaries) that were managed under an extensive production system in various agroclimatic conditions. Animals of both sexes and various age and body condition groups were randomly selected 450 in each districts of study area with 95% confidence interval. Age was determined on the basis of the owner's information and dentition. Body condition scoring (BCS) was graded as poor, medium, or good using the modified guidelines described by [22,23].

4. Sampling and tick's collection

The sample size was calculated using the formula described by Thru field et al [24]. Considering the 50% expected prevalence, 5% absolute precision, and 95% confidence interval, 384 animals were required for the sampling. However, considering the vastness of the stud area 450 animals were sampled from each district, making a total of 900 camels and cattle. A multistage random sampling approach was used to collect ticks from cattle and camels in pastoral areas of the selected districts. Morphological tick's ident cation after collected properly labeled plastic container adds % ethanol identified by using a stereomicroscope [25].

5. Data Analysis

The data collected were entered in to MS-Excel 2000 computer program. The analysis and summarization of the data was made using descriptive statistics.

6. Results and Discussion

The study conducted four kebele in each district, with each carried out in a different kebele total eight groups and 10-12 key respondents were conducted as semi structured, key focusing groups, proportional pilling and participating in each [20, 21]. Eight groups namely (cabi,cophi,Bareda and Gara gafa) and (urgo ,sela, Ija goda and Roqa) Gola oda and kumbi kebele respectively.

Ectoparasites	Kumbi Mean ± SD score	Gola oda Mean ± SD score	Rank
Ticks (Shilin)	57.0 ±6.218	63.50 ±5.508	1
Mites (Cadho)	28.50 ± 1 915	24.0 ± 5.657	2
Lice (Injir)	14.50 ±5.260	15.0 ± 10.00	3
	W= 1 ($p < 0.018$)	W = 0.813 ($p < 0.039$)	

Table 1: The proportion of mean score and ranks of tick's mite and lice of both districts indicated as table below

Animal category	Kumbi Mean ± SD score	Gola oda . Mean ± SD score	Rank
Young camel	23.00 ±6.27	23.00 ±4.76	2
She camel	16.25 ±4.79	17.25 ±3.50	3
Adult camel	9.50 ±4.20	8.50 ± 1.29	6
Young cattle	23.50 ±4.73	25.75 ±4.65	1
Cow	16.50 ±4.73	14.00 ±5.88	4
Adult cattle	11.25 ±2.99	11.50 ± 1.92	5
	W = 0.788 (p = 0.008)	*W = 0.640* (*p* = 0.025)	

Table 2: Proportional results tick burden associate with risk factors of hosts (age sexes) significant rank and mean score in both districts with direct proportion with age

Tick control option	Kumbi Mean ± SD score	Rank	Gola oda Mean ± SD score	Rank
Topical acaricides	42.50 ±6.46	1	40.00 ±4.082	1
Ivermectin	20.00 ±9.13	3	23.75 ±4.787	2
Manual removal	16.25 ±7.50	4	18.75 ±4.787	3

Table 3: The proportion response of controlling of ticks in camel and cattle significant in rank and mean score in both districts with orders of effectiveness of acaricide ivermectin and manual removal

Season	Kumbi Mean ± SD score	Rank	gola oda Mean ± SD score	Rank
Spring	45.00 ± 10.801	1	51.501 8.888	1
Autumn	25.75 ± 9.946	2	21.751 8.500	2
Summer	16.25 ± 16.008	3	15.5013.317	3
Winter	13.0017.257	4	11.2516.292	4
	W = 0.475, p = 0.127		W = 0.700, p = 0.038	

Table 4: Proportion of tick burden based upon session with significant mean score and ranking in both districts as well as higher tick burden in spring than winter as below

Tick genera	Tick species	Male	Female	Total	Prevalence (%)
Amblyomma	*A. gemma*	101	5065	5166	26.3
	A. lepidum	1106	498	1604	6.7
	A. variegatum	1013	771	1784	6.5
Hyalomma	*H. truncatum*	1759	1675	3434	11.6
Rhipicephalus	*R. pulchellus*	4140	4482	8622	48.9
Total no. of ticks		8119	12,491	20,610	100

Table 5: The proportion of epidemiological distribution of tick's specie based on prevalence

Variable	Category	No. examined	No. positive (%)	x^2	*p* value
Animal origin	Kumbi	450	375 (83.3)	2.24	0.13
	gola oda	450	391 (86.8)		
Sex	Male	254	220 (86.6)	0.63	0.43
	Female	646	546 (84.5)		
Age	Yoyung	506	408 (80.6)	18.30	0.001
	Adult	394	358 (90.8)		

BCS	Good	217	156 (71.9)	40.615	0.001
	Medium	481	425 (88.4)		
	Poor	202	185 (91.6)		
Animal species	Camels	510	434 (85.1)	0.00	0.99
	Cattle	390	332 (85.1)		

Table 6: The variation of prevalence of tick infestation in this study area based the following host factors and origin of animals. BCS and age of animal's direct proportion with prevalence

Variable	Category	No inffected (%)	Mean	SD±	95%CI		*F*	*p* val
Origin	Kumbi	375 (83.3)	23.76	16.804	22.21	25.32	1.993	0.158
	gola oda	391 (86.8)	22.19	16.625	. 20.65	23.73		
Sex	Male	220 (86.6)	22.80	16.387	21.53	24.06	0.271	0.603
	Female	546 (84.5)	23.44	17.577	21.27	25.61		
Age	Young	408 (80.6)	21.65	16.887	20.17	23.12	7.379	0.007
	Adult	358 (90.8)	24.69	16.376	23.07	26.31		
BCS	Good	156 (71.9)	22.43	17.224	19.98	24.88	0.131	0.877
	Medium	425 (88.4)	23.15	17.102	21.65	24.65		
	Poor	185 (91.6)	23.07	15.358	20.97	25.16		
Animal species	Camels	434 (85.1)	24.54	18.049	. 22.74	26.33	6.007	0.014
	Cattle	332 (85.1)	21.79	15.549	20.43	23.14		
Months	June	127 (84.7%)	26.16	18.606	23.16	29.16	31.009	0.001
	July	133 (86.4%)	27.90	17.005	25.19	30.60		
	Aug	120 (79.5%)	17.00	11.759	15.11	18.89		
	Sep	206 (84.1%)	15.59	8.327	14.54	16.64		
	Oct	58 (89.2%)	25.54	16.492	21.45	29.63		
	Nov	122 (90.4%)	32.69	21.750	28.99	36.39		
Season	Wet	307 (87.7%)	28.56	19.750	26.49	30.64	68.682	0.001
	Dry	459 (83.5%)	19.42	13.323	18.31	20.54		

Table 7: Tick density significantly associated with season and months of sampling, with the highest mean tick density in dry and wet season.

Over all prevalence of 85.1%, for both camels and cattle, this is consistent with the previous studies conducted in Ethiopia [26,27]. Again camels 82.8%, cattle 81.3.3% of prevalence were reported o from eastern Ethiopia and northwestern Ethiopia respectively [28,29]. Contradict camels 96.6%, cattle 98.2% of prevalence were reported from southern zone of Tigray and Southern Ethiopia [30,31]. The tick species discovered in this study have been previously reported in camels and cattle in various parts of the country, including camels [32–34] and cattle in South western Ethiopia [35]. Rhipicephalus, Amblyomma, and Hyalomma. This aligns with the findings of [33], who reported similar genera in the Tigray and Borane regions of Ethiopia. In the current study, R. pulchellus was the predominant tick species found on camels and cattle, comprising 48.9% of the ticks. This was followed by A. Gemma at 26.3%, H. truncatum at 11.6%, A. lepidum at 6.7%, and A. variegatum at 6.5%. It is worth noting that previous studies have also reported a higher prevalence of R. pulchellus in camels, with prevalence rates of 70.47%, 85.2%, and 27.86% [32,30,34]. R. pulchellus has been reported as the most common tick species in cattle with a prevalence of 75.2%. The wide prevalence of R. pulchellus can be attributed to its distribution in climatic regions such as savannas, steppes, and deserts [31]. Moreover, it is the most frequently encountered tick species in Northeast Africa and Rift Valley regions [25]. The results of this study revealed that among all the species, female ticks were more abundant than males, except for A. gemma and A. lepidium. This finding is consistent with [26,33], who conducted similar studies on different domestic animals. The higher number of female ticks found in animals can be attributed to their increased need for blood to produce eggs and their longer lifespan relative to male ticks,resulting in prolonged attachment periods. However, in certain species within the Amblyomma genus, female ticksmay detach from the host after becoming fully engorged to lay eggs, while male ticks may continue feeding and mating for extended periods. In some cases, female ticks of these species may also attach to the host's skin in response to aggregation pheromones produced by feeding males [36].

Poor body condition having a higher rate of infestation. These results

are consistent with the findings of [37] but contradict those reported by [30]. In contrast, no significant variation in the prevalence of tick infestation was observed between the different areas of sampling (PAs). This observation is in line with the results reported by [32] for camels and [26] for cattle but appears to contradict the findings of [38] in the Jigjiga Zone, which suggested that tick infestation rates were influenced by the animals' living environment. Temperature and relative humidity are crucial ecological factors that influence the distribution and abundance of ticks in a given environment [39]. The absence of variation in the present study may be due to similarities in climatic conditions in the sampled peasant associations [40]. the results of this study indicated that the prevalence of tick infestation was significantly higher ($p < 0\ 05$) in adult animals (90.8%) than in young animals (80.6%). This finding contradicts that of [29]. The higher prevalence of ticks in adult animals may be explained by their increased mobility and greater chance of encountering other animal species, resulting in greater exposure to ticks and an increased risk of tick infestation. However, there was no statistically significant difference ($p > 0\ 05$) in tick infestation rates between the male and female hosts. This finding is consistent with previous research conducted by [41] in Sudan and [42] in Iran on camels, as well as [25] in Belgium on cattle. Tick infestation varied significantly by month and season, with the highest prevalence in October (89.2%) and November (90.4%) and during the wet season (87.7%), although ticks were found on cattle throughout the study period. Tick infestation is known to persist all year round, although density may increase during wet seasons [43]. The study reported a significant increase in tick counts during the rainy season compared to the dry season [44]. The present study indicated that tick infestation was the most common ectoparasitic disease, followed by mange and pediculosis [46].

Conclusion

Ticks are one of the major ectoparasites that affects camels and cattle with high prevalence of 85.1% in Ethiopia, wich reduce production and productivity of camels and According to the present study higher prevalence R. pulchellus with respective A. gemma, H. truncatum, A. variegatum, and A. lepidum. variables on risk factors considered; origin, sex, age, body condition and season of the years were significant risk factors.Tick density and tick burden with the highest mean tick density were wet season and high tick burden in spring season. Fulfilling necessary requirements strategic control, creation of social awareness and increase capacity building of Veterinary services in both woreda. Consent Verbal consent was obtained from livestock owners for the inclusion of their animals in the study and participatory data collections. Ticks were collected and examined by a veterinarian with respect to the preservation of animal health and welfare.

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