Prevalence of Bovine Babesiosis in Selected District of East Wollega Zone, Western Ethiopia

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Abstract

animals. To determine the frequency of bovine babesiosis and related risk factors, a cross-sectional study was carried out in two selected districts of East Wollega, Oromia regional state of Ethiopia. Blood sample was collected, thin and thick smears were made, and their ability to identify *Babesia* parasites was assessed. Anemia was evaluated using the packed cell volume. An overall prevalence of 5.2% was observed in 20 of the 384 (268 female and 116 male) animals that were purposefully chosen and analyzed to have *Babesia* parasites. *Babesia bovis* infection was found in 15 (3.91%) of the *Babesia*-infected animals, while *Bovis bigemina* infection was found in 5 (1.30%). The prevalence of bovine Babesiosis was substantially (p<0.05) correlated with risk variables, such as animal husbandry practices and previous treatment with anti-*Babesia*

the animals' age, sex, breed, or body condition score (P > 0.05). Bovine babesiosis was more common in male animals (6.0%) than in female animals (4.9%). The highest incidence (6.1%) was found in old (> 7 year-old) animals, followed by mature animals (4-6 years) (5.2%), while the lowest prevalence (4.2%) was seen in young (<3 year-old) animals. Similar to other animals, the incidence was higher in cattle with low body condition ratings (7.1%) than in those with medium and high ratings (5.0%) and 1.2%, respectively. Bovine babesiosis was discovered to be pervasive in the research area and to be a serious danger to the production of cattle in general. Appropriate methods must be created

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of disease in cattle brought on by the protozoan parasites *B. bo i* , *B. bigemina*, and *B. di e gen* . e primary carriers of *B. bigemina* and *B. bo i* , *Rhipicephal* (previously *Boophil*) spp., are found across tropical and subtropical regions. *I ode icin* is the main carrier of the *B. di e gen* [7, 8]. It is a protozoan parasite that is a member of the phylum *Apicomple a*, order *Pi opla mida*, subclass *Pi opla m ia*, and genus *Babe ia*. Piroplasmas are so named because their pear-shaped merozoites reside as tiny parasites inside mammals' red blood cells (RBC). Babesiosis is a hemolytic illness that can cause a rapid

bigemina is frequently di
one another. *Babe ia big*
there are other unique v
mm wide. In paired form
red-staining spots. Sporo
tick bite and immediately
transform into piroplasm
producing two or, occas
host able to infect more e
the health of the cattle as
has signi cant economic
it a ects adults more sev
direct losses through mo
and milk [7]. Babesiosis m
vaccination, chemoproph
prevalence of illness can b
like *B. indic* [8]. ere
the frequency of bovine ba
out across Ethiopia to as
bovine babesiosis [1, 2].
investigate the prevalence
factors in the study area.

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e study was carried out in Guto Gida and Diga district, which is located in East Wollega, Oromia regional state of Ethiopia. e districts 2,088 meters above sea level in latitude 90° 5'N and longitude 36°33' East. Nekemte is 331 kilometers west of Addis Ababa, the nation's capital. e lengthy summer rainy season (June to September), the short rainy season (March to April), and the dry winter seasons rotate in the climate (December to February). e ranges for daily temperatures and yearly rainfall are correspondingly 1450 to 2150mm and 15 to 27C. e region has a total land area of roughly 729,725 hectares, of which 3366,220 hectares are utilized for crop production, 184,412 hectares are used for animal grazing, 256,901 hectares are covered in forest, and 20,492 hectares are used for other purposes.

A cross-sectional study design was employed to determine the prevalence of bovine babesiosis and associative risk factors in selected district of East Wollega Zone of Oromia regional state, Ethiopia.

Sa e e de e a

e total sample size was determined according to the formula given by rus eld given below; using a ve percent desired absolute precision, 95% con dence interval and 50% expected prevalence. Accordingly, the total sample size would be 384.

$$N = \frac{1.96^2 \, Pexp \, (1\text{-}Pexp)}{d^2}$$

Where N = required sample size, P exp= expected prevalence, d = desired absolute precision (0.05). Accordingly, 384 animals were included in this study.

Sa g e d a d ce f d a a

Cattle presented to Nekemte veterinary clinic of Guto Gida district and Diga veterinary clinic of Diga district were included in the study. Nekemte and Diga veterinary clinics were selected based on purposive sampling because of the number of cattle presented to the clinics and their accessibility. Purposive sampling technique was utilized to obtain study animals from both Nekemte and Diga veterinary clinics. During sampling a clinical sign like change in urine colour, yellowish and paleness of visible mucous membrane and tick infestation was considered as criteria to purposively selected animals. Accordingly, 219 animals were selected from Nekemte veterinary clinic and 165 were selected from Diga veterinary clinic.

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e blood sample was collected either from the jugular vein or ear vein a er proper restraining of the animal according to Urquhart. Before blood collection, the area of blood collection by puncture was cleaned; the hair was removed and disinfected with 70% alcohol. Blood sample was collected from the jugular vein by a heparinized vacutainer tube and by hematocrit capillary tube from ear vein and transported to Wollega University Veterinary Parasitology laboratory in ice box. Age, sex and body condition score of the studied animals were recorded during sampling. e ages of the animals was determined based on owners' information and as described by De-lahunta and Habel and also the body condition of the animals was determined according to Nicholson and Better worth.

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in and thick blood smears on clean and dry glass slides were prepared from the blood samples. in blood smear lms were air-dried and xed in absolute methanol for 2-5 minutes and stained with Giemsa for 30 minutes, washed with tap water to remove an extra stain, and air-dried slides were examined under the oil immersion lens of a light microscope. Morphological characteristics of *Babe ia* species were identi ed according to key Soulsby. ick lms were made by placing a small droplet of blood onto a clean glass slide and spreading this over a small area using in a circular motion on the corner of another slide, air-dried and stained in Giemsa. is is a more sensitive technique for the detection of *Babe ia* species, as RBCs are lysed and parasites concentrated, but species di erentiation is more di cult. PCV was measured to know the level of anemia for each individual animal. PCV was measured by lling blood into a hematocrit capillary tube up to ¾ its volume and sealing in soap and placing in a hematocrit centrifuge for 15000rp per 5 minutes. A er centrifugation measured by PCV recorded.

D

Data collected were recorded properly and entered into a Microso Excel spreadsheet and analyzed using SPSS for Windows version 20 (SPSS Inc., Chicago, IL, USA) coded. Data were summarized using descriptive statistics. e associations between the prevalence of Bovine *Babe ia* infection and the associated risk factors (age, sex and body condition score) were evaluated using logistic regression analysis. Student's t-test was applied to examine the di erences in mean PCV values among *Babe ia*s infection status. Analysis of variance (ANOVA) was applied to compare the mean PCV values of infected animals with di erent *Babe ia* species. Di erences were considered to be signi cant as $P < 0.05$ at 95% con dence interval.

R

In this study, 384 cattle were examined to determine the prevalence of bovine babesiosis. e majority of the animals were local breeds (91.9%) and female (69.8%) animals. Most cattle had poor body conditions and the majority of them were (86.7%) reared under an extensive management system. Among the 384 cattle examined 20 (5.2%) were found to be infected with *Babe ia.* e dominant *Babe ia* species identi ed in the study area was *Babe ia bo i* 15(3.91%) followed by *Babe ia bigemina* 5(1.30%). A univariable logistic regression analysis was carried out to examine the associations of age, sex, breed, body condition score, and management system categories of the cattle with the prevalence of *Babe ia* Table 1. e prevalence of babesiosis was higher in cross breed 19(5.4%) cattle than in local 1(3.2%) breed of cattle but, the prevalence was not signi cantly varied among breed of cattle ($P > 0.05$). A univariable logistic regression revealed that cattle of poor body condition score were more likely to be a ected by *Babe ia* than good-conditioned animals (OR = 6.25; 95% CI: 0.74%-53.1%). e odds of the infection of babesiosis in poor conditioned cattle were 6.25 times more likely than in cattle of good body condition score with 0.74%-53.1%. N, Number examined; BCS, Body condition score; †, Reference category; MLE, Maximum Likelihood Estimate; SE, Standard Error; OR, odds ratio; CI, con dence interval

PC R

In this study, the overall mean packed cell volume (PCV) value of the sampled animals was 24.6% ± 1.8. e mean PCV values among

Babe ia infected and uninfected cattle variables were compared using student's t test (Table 2). e mean PCV values of examined animals signi cantly ($P < 0.05$) varied with infection status. e mean PCV value of *Babe ia* infected (22.3% ± 1.3) cattle was signi cantly ($P < 0.05$) lower than that of uninfected (24.7% ± 1.7) animals.

D

e overall prevalence of Bovine babesiosis in the selected district of East Wollega was 5.2%, in which is markedly lower than the previous ndings of 12.8% (50/390) reported from in and around Jimma Southwestern Ethiopia, 16.9% (65/384) reported from Teltele district, northwest Borana zone, southern Ethiopia. On the other hand, it is higher than the report of Wodajnew and Sitotaw who reported a prevalence of 1.5% (6/402) and 0.9% in and around Assosa Woreda Benishangul Gumuz regional state Western Ethiopia and at Bisho u respectively. is variation in the prevalence of bovine *babe io i* may be caused by various factors, including animal husbandry practices, anti-parasitic drug use for vector control, parasite variation in carriers of the disease over time, test sensitivity, distribution th,

SPSS: Statistical Package for Social Science

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

E A

e Haramaya University College of Veterinary Medicine approved this study. e o cial letter was written to the district veterinary clinics. e study purpose was explained, and the permission to get sample from animals was granted.

C I

e authors declare that they have no con icts of interest.

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E N and J G were involved in the design of the study; E N. collected data. A E and E N analyzed the data and dra ed the manuscript. E N, J G, and A E revised the manuscript; all authors approved the nal manuscript.

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