

A. Takele¹
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TAKELE (A.), ABEBE (G.). Enquête sur la trypanosomose dans la région du Gému-Gofa (Éthiopie). *Revue Elev. Méd. vét. Pays trop.*, 1988, 41 (3) : 271-276.

L'enquête a été conduite dans trois provinces de la région administrative du Gému-Gofa en Éthiopie, sur une période de huit mois. Un ensemble de 1 862 bovins, 111 caprins, 37 ovins, 47 ânes et mules et 2 chiens a été pris en compte. Dans presque 95 p. 100 des localités, des infections ont été trouvées. La prévalence générale de la trypanosomose dans les trois provinces était de 32 p. 100. Un taux de prévalence plus élevé chez les caprins et les équins et une réceptivité plus grande de ces espèces à la trypanosomose ont été révélés dans la région de l'enquête. Par ordre d'importance relative, les espèces de trypanosomes rencontrées étaient *Trypanosoma congolense*, *Trypanosoma vivax*, *Trypanosoma brucei*, *Trypanosoma theileri* et *Trypanosoma evansi*. Les infections combinées et les espèces non identifiées étaient fréquentes. L'efficacité a été testée entre les étalements de sang en couches minces, en gouttes épaisses et sur sang frais et la technique de centrifugation microhématocrite pour la diagnose de la trypanosomose animale. L'analyse statistique faite de la température du corps, du volume globulaire sanguin des animaux naturellement infectés et des animaux trouvés non infectés a révélé une différence statistiquement significative dans le volume sanguin moyen et une variabilité dans la température corporelle moyenne entre ces groupes. *Mots clés* : Bovin - Ovin - Caprin - Équin - Chien - Trypanosomose - Trypanosome - Diagnostic - Examen hématologique - Température corporelle - Volume globulaire sanguin - Éthiopie.

INTRODUCTION

Trypanosomiasis is a parasitic disease caused by species of flagellate protozoa belonging to the genus *Trypanosoma* which inhabit the blood plasma, various body tissues and fluids (2). The parasites are frequently pathogenic and lethal to man and domestic animals.

There are many trypanosomes species, but the most important ones in economic terms are those which infect domestic ruminants in Africa: *Trypanosoma congolense*, *Trypanosoma vivax* and *Trypanosoma brucei* (5).

Trypanosomiasis causes a significant loss in animal

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production and it greatly hampers people and animals settlement in a considerable part of the world.

New settlement programmes and additional agricultural development schemes, which are of prime importance to advance the national economy, are planned and some established in the administrative region of Gamu Gofa. A full understanding of some hindrances like trypanosomiasis situation in the region, is presently of significance to the implementation of these programmes.

With this in the background the present study attempted to clarify the prevalence of trypanosomiasis, the relative importance of trypanosome species and the effect of the disease in domestic animals of Gamu Gofa region.

MATERIALS AND METHODS

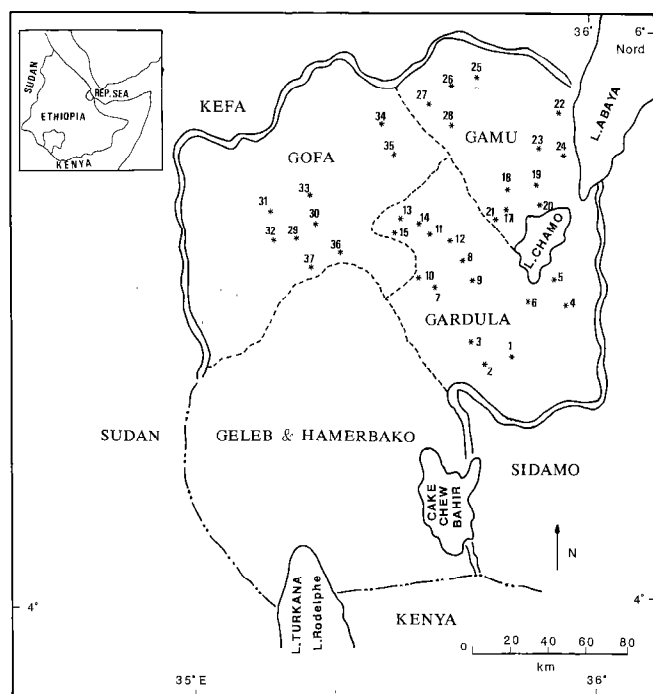
Study area

The base of operation for survey was the veterinary clinic of Arba-Minch, the capital town of the administrative region. The survey was conducted in 37 villages of woredas with three provinces of the region (Map 1).

The administrative region lied between 4°N to 6°N latitude and between 35°E to 36°E longitude. It is one of the southern administrative region of Ethiopia, with an area of 41,180 km² of which 4.76 p. 100 of the total area 1,960 km² is covered by water (6).

The geography, climate and vegetation of the region is not well studied. But the sporadic studies made by Ministry of Agriculture representative Office divided the province into 5 climatic zones (High land, Dega, Weinadega, Kola and Desert).

The survey was done from October 1984 to May 1985. Places for conducting the survey were chosen for their access of transportation and availability of animals. The places were mostly grazing lands, watering points, gathering points, producers co-operative farms and veterinary clinics where animals were easily found to take samples randomly.



Map 1: The Gamu Gofa region administrative limits. * 1-37: villages where animals were sampled.

Animals examined

According to the estimation made in 1976, the livestock population of Gamu Gofa region consists of 775,000 bovines, 652,000 ovines, 720,000 caprines and 233,000 equines (10).

In this study a number of bovines, ovines, caprines, equines and canines were examined.

Blood examination

For conducting the survey thick and thin blood films were taken from the ear vein of cattle, chosen randomly in each place.

The animals were bled in the morning (08.00-10.30). Thick film was made on around the end of a slide, over an area having 1.5-2 cm of diameter, while the remaining area of the slide was used for making thin smear.

The part of the slide containing well dried thick film is immersed into distilled water for dehaemoglobinizing. When dried both parts of the smear were fixed with methanol and stained with Giemsa stain (1:10) for 2 hours for better appreciation of the species of trypanosomes.

Thick blood films were examined with $\times 100$ oil immersion objective for the diagnosis. In order to increase

the chance of finding the scanty trypanosomes and to save time, thin films were first searched with $\times 40$ dry objective lenses and details of morphology are then studied with $\times 100$ oil immersion objective. The species of trypanosomes were identified according to HOARE (4).

Wet film preparations were also taken simultaneously, in Gardula and Gamu province, for the reason of comparison of efficiency of this technique with above diagnostic methods (Map 1).

When conditions suit thick and thin blood films were taken similarly, from other domestic animals (goat, sheep, donkey, mule and dog).

To observe the effect of trypanosomiasis on haematocrit value, blood samples were collected into heparinized microhaematocrit centrifuge capillary tubes. The capillary samples were sealed with cristaseal (Hawksley and Sons Ltd) and spun for 5 minutes in a microhaematocrit centrifuge. The value of the packed cell volume (PCV) of each sample is recorded and then the upper most layer of red blood cells and buffy coat was extruded on to a slide and examined for motile trypanosomes (3).

The body temperature of the animals that were bled for PCV determination was taken rectally and recorded accordingly.

RESULTS

During this survey 1,449, 678 and 238 cattle were examined with wet, thick and thin blood films and microhaematocrit centrifuge technique respectively. In addition 111 goats, 37 sheep, 42 donkeys and mules and 2 dogs were considered.

As the result of this study, the overall prevalence rate of bovine trypanosomiasis in the three surveyed provinces had been found to be 32 p. 100 (Table I). Gofa province had higher prevalence ($\bar{X} = 49$ p. 100) followed by north western part of Gamu province ($\bar{X} = 41$ p. 100), while the prevalence in Gardula province was lower.

The different species of trypanosomes including *T. congolense*, *T. vivax*, *T. brucei* group and *T. theileri* with some mixed infections were found in cattle. The ratio infection species to species was, *T. congolense*, *T. vivax* and *T. brucei* group = 15.1 : 7.1 : 1 (based on 107, 50 and 7 infections respectively (Table I). However the presence of inconsistent morphological pictures of trypanosomes led to the suspicion of the occurrence of some other species of trypanosomes, not considered so far in this work or other previous works in Ethiopia.

TABLE I Prevalence of bovine trypanosomiasis in Gamu Gofa region.

Areas of Sampling		Sample size	<i>T. congolense</i>	<i>T. vivax</i>	<i>T. brucei</i>	<i>T. theileri</i>	Mixed infection	Unidentified	Total positive	Per cent positive
Province	Woreda									
GARDULA	Konso	35	4	—	—	—	—	—	4	11
	Gumaide	70	7	5	—	—	1	3	16	23
	Gidole	75	4	2	1	—	—	2	9	12
	Geresse	30	1	1	—	—	—	1	3	10
	Kemba	55	3	1	2	—	2	1	9	16
	Total	265	19	9	3	—	3	7	41	15
	* Arba Minch	1 184*	121*	45*	21*	2*	30*	33*	252*	22*
GAMU	Arba Minch	85	7	7	2	—	3	3	22	26
	Mirab Abaya	54	15	7	—	—	2	4	28	50
	Kucha	50	13	2	—	—	—	5	20	40
	Deramalo	40	4	2	—	—	—	7	13	32
	Total	229	39	18	2	—	5	19	83	36
GOFA	Gofa Zuria	79	16	12	—	—	—	10	38	48
	Zala	43	16	2	2	—	2	—	22	51
	Oubamale	62	17	9	—	—	—	5	31	50
	Total	184	49	23	2	—	2	15	91	49
	Aggregate	678	107	50	7	—	10	41	215	32
	p. 100		50	23	3		5	19		

* Not included in the aggregate because it is obtained with wet films in Arba Minch.

TABLE II Trypanosomiasis of domestic animals other than cattle.

Animals	Number of parasitaemic								Per cent Positive
	n	Tc	Tv	Tb	Te	Mixed	Un.id	Total	
Goat	111	15	12	—	—	2	5	34	31
Sheep	37	—	—	—	—	—	—	—	—
Donkey & Mule	42	5	1	1	1	1	—	10	24
Dog	2	—	—	—	—	—	—	—	—

Tb = *T. brucei*; Tc = *T. congolense*; Te = *T. evansi*; Tv. = *T. vivax*; Un. id = Unidentified.

The study in other species of domestic animals showed 31 p. 100 and 24 p. 100 of prevalence of trypanosomiasis in goats and donkeys and mules respectively (Table II). In both species *T. congolense* is the predominant species of trypanosomes followed by *T. vivax*. In sheep no case of infection was found.

The comparison made between thick, thin and wet films in Gardula province, in diagnosis of trypanosomiasis resulted with an infection rate of 15 p. 100,

12 p. 100 and 11 p. 100 respectively (Table III). In other survey in Arba-Minch veterinary clinic considered 1,184, 50, 50 and 238 cattle with wet, thick, thin film and microhaematocrit centrifuge technique respectively (Table IV). The response of the local prevalence rate to these techniques was 22 p. 100, 26 p. 100, 20 p. 100 and 38 p. 100 as mentioned orderly, which may correspond with the sensitivity of the techniques in the diagnosis of trypanosomiasis.

The comparison made on the haematocrit value of naturally infected cattle and between those uninfected yet living in the same environment, in Arba-Minch town, revealed that the mean PCV of parasitaemic cattle was 20.74 p. 100 ($\bar{X} \pm 5.4$) compared to that of 25.65 p. 100 ($\bar{X} \pm 4.25$) for cattle diagnosed as aparasitaemic. In addition these mean values differ significantly ($P < 0.05$, t-test) and the PCVs of parasitaemic animals were found to be more variable ($CV = 0.26$ vs 0.16) and decreased as low as 10-15 p. 100 in some cases. While no cases of aparasitaemic cattle was found having PCVs within this range (Fig. 1).

The clinical examinations done for the above two groups of animals showed that the former group has an average body temperature of 38.87 °C compared to 38.6 °C of the latter group. There was no significant

TABLE III Point prevalence rates for herd in cattle in Gardula awraja (province) as judged by wet, thick and thin blood.

Places of origin	Wet Smear			Thick Smear			Thin Smear		
	n	+ ve	p. 100	n	+ ve	p. 100	n	+ ve	p. 100
GUMAIDE									
Segen	30	3	10	30	5	17	30	3	10
Buniti	20	3	15	20	5	25	20	4	20
Kabura	20	4	20	20	6	30	20	5	25
Total	70	10	14	70	16	23	70	11	15
GARDULA ZURA									
Gidole	20	0	0	20	0	0	20	0	0
Hargoba	20	4	20	20	6	30	20	4	20
Gato	15	3	20	15	3	20	15	3	20
Moro	20	0	0	20	0	0	20	0	0
Total	75	7	9	75	9	12	75	7	9
GERESSE									
Bonke	15	0	0	15	0	0	15	0	0
Ossa	15	2	13	15	0	20	15	2	13
Total	30	2	6	30	3	10	30	2	6
KEMBA									
Otolo	20	3	15	20	1	5	20	1	5
Delbe	15	2	13	15	2	13	15	2	13
Mero	20	4	20	20	6	30	20	5	25
Total	55	9	16	55	9	16	55	8	14
KONSO									
Bekewele & Gewada	35	3	8.5	35	4	11	35	4	11
Aggregate	265	31	11	265	41	15	265	32	12

TABLE IV Response of the local infection rate of trypanosomiasis to the different parasitological techniques at Arba Minch.

Methods of diagnosis	Size sample	Infection	
		Total	Rate (p. 100)
Wet film	1 184	252	22
Thick film	50	13	26
Thin film	50	10	20
Microhaematocrit Centrifuge Technique	238	94	38

variation between these two means ($P \leq 0.05$, t-test). But the body temperature of the naturally infected animals is relatively more variable than the non infected animals (CV = 0.05 and 0.006 respectively).

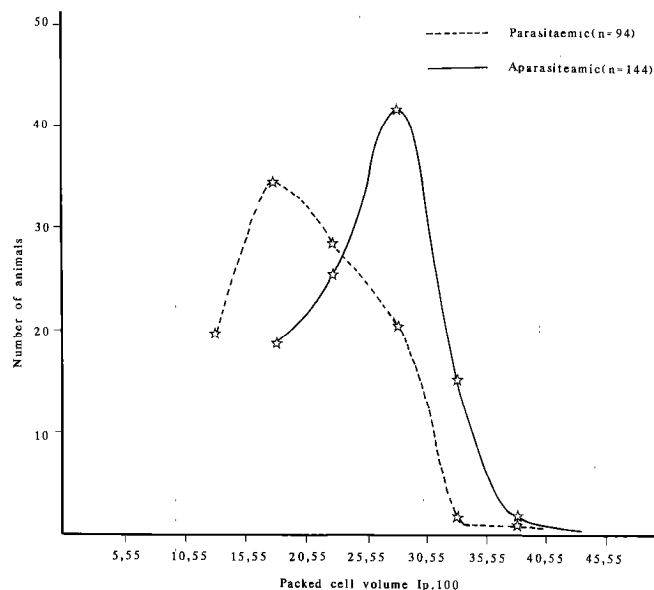


Fig. 1: The frequency distribution of PCV of parasitaemic and aparasitaemic animals in Arba-Minch diagnosed by microhaematocrit centrifuge technique.

DISCUSSION

The prevalence of animal trypanosomiasis in the present study is greater than in the previous surveys in the region. The pressure for arable land and the prevailing drought that forced animal to graze in bushes and river banks that are highly infested with tsetse flies, the increasing of areas infested with tsetse flies, weak control measures of the disease and other epidemiological changes in the region may be attributed to the growing prevalence of the disease as observed in the present study.

An increased ratio of infections of *T. congolense* is found. The predominance of *T. congolense* indicates the increased contact of animals with tsetse vector and the lesser importance of biting flies in the transmission of the disease (3). The increased ratio of infection with *T. congolense* may suggest that the major cyclical vectors are the savanna tsetse flies (*Glossina morsitans submorsitans* and *Glossina pallidipes*) which are more efficient in transmitting *T. congolense* than *T. vivax* in East Africa (7).

The higher infection rates (31 p. 100) and unfavourable clinical symptoms observed in this survey, in goats, refutes the statements mentioned somewhere (8, 9) about small ruminants and calls for payment of attention toward these animals whenever problems of trypanosomiasis raised.

According to the present work, the wet film preparations are less important than microhaematocrit technique and thick films in diagnosis of trypanosomiasis. However, the work felt that the lesser sensitivity of wet films may be attributed to the time and conditions in the field available for examining the films. In addition it is remarked that with low parasitaemia the actively moving trypanosomes may shift from the fields of the wet film, which are not yet examined, to the fields which are already examined. Nevertheless, its merit of simplicity, quickness and closer efficiency to other techniques (thick and thin films), as noted in this work, makes the wet film preparation the most chosen

TAKELE (A.), ABEBE (G.). A survey of trypanosomiasis in Gamu Gofa region (Ethiopia). *Revue Elev. Méd. vét. Pays trop.*, 1988, 41 (3) : 271-276.

The survey was conducted in three provinces of Gamu Gofa administrative region of Ethiopia, over a period of eight months. Altogether 1,862 cattle, 111 goats, 37 sheep, 42 donkeys and mules and 2 dogs were considered. Almost in 95 p. 100 of places, infections were found.

diagnostic technique in field.

The normal PCV extreme values of bovine species (24-46 p. 100) (1) is scored by 31 p. 100 of parasitaemic cattle compared to 73 p. 100 scored by aparasitaemic cattle. But the mean PCV of both groups is either below or in the lowest range of normal PCV values (Fig. 1). The parasitaemic groups showed low PCV values on average basis. This lower PCV values may show the effect of trypanosomiasis in reducing PCV values and provoking anaemia. But the lower haematocrit value in endemic area is not always conclusive for the presence of trypanosome infection, because trypanosomes were not detected in many animals with low PCVs, conversely many animals having relatively higher PCVs were found to be infected.

The highly decreased PCV of the population, in both naturally infected and uninfected groups, strongly indicates the presence of factors, rather than trypanosomiasis, which greatly cause anaemia in the herd living around Arba-Minch area.

CONCLUSION

It is felt that the majority of cattle population in the survey area were able to survive with the higher level of trypanosome challenge. In this respect, it seems that the local zebu breed of cattle in this area has a considerable degree of resistance to trypanosomiasis. Further studies are then necessary to assert this proposition.

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TAKELE (A.), ABEBE (G.). Encuesta sobre la tripanosomosis en la región del Gemu-Gofa (Etiopia). *Revue Elev. Méd. vét. Pays trop.*, 1988, 41 (3) : 271-276.

Se efectuó una encuesta en tres provincias de la región administrativa del Gemu-Gofa en Etiopia durante un periodo de ocho meses. Se observaron un total de 1 862 bovinos, 111 cabras, 37 ovinos, 47 asnos y mulas y 2 perros. En casi 95 p. 100 de las localidades se encontraron

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The general prevalence of trypanosomiasis in the three provinces was 32 p. 100. Higher prevalence rate in caprines and equines and susceptibility of these species to trypanosome infection, is felt in the survey area. By order of relative importance, the trypanosome species encountered were *Trypanosoma congolense*, *Trypanosoma vivax*, *Trypanosoma brucei*, *Trypanosoma theileri* and *Trypanosoma evansi*. Mixed infection and unidentified species were common. Efficiency was tested between thick, thin and wet blood films and microhaematocrit centrifuge technique in diagnosis of trypanosomiasis. Statistical analysis done in body temperature and packed cell volume (PCV) of naturally infected animals and between animals that were found non infected revealed a statistically significant difference in the mean PCVs and variability in the mean body temperature of these groups. *Key words*: Cattle - Sheep - Goat - Horse - Dog - Trypanosomiasis - Trypanosoma - Diagnosis - Blood examination - Body temperature - Packed cell volume - Ethiopia.

infecciones. Era de 32 p. 100 la prevalencia general de la tripanosomiasis en las tres provincias. En la región de la encuesta se evidenciaron un porcentaje de prevalencia más elevado en las cabras y los equinos y una receptividad más importante de estas especies para con la tripanosomiasis. Por orden de importancia relativa, las especies de tripanosomas encontradas eran *Trypanosoma congolense*, *Trypanosoma vivax*, *Trypanosoma brucei*, *Trypanosoma theileri* y *Trypanosoma evansi*. Las infecciones combinadas y las especies no identificadas eran frecuentes. Se comprobó la eficacia entre la extensión de sangre en capas delgadas, en gotas espesas y en sangre fresca y la técnica de centrifugación microhematocrita para el diagnóstico de la tripanosomiasis animal. El análisis estadístico de la temperatura del cuerpo, del volumen globular sanguíneo de los animales naturalmente infectados y de los animales encontrados no infectados mostró una diferencia estadísticamente significativa en el volumen sanguíneo medio y una variabilidad en la temperatura corporal media entre estos grupos. *Palabras claves*: Bovino - Ovino - Cabra - Equino - Perro - Tripanosomiasis - Tripanosoma - Diagnóstico - Examen hematológico - Temperatura corporal - Volumen globular sanguíneo - Etiopia.

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