

Bovine Parasite Ticks, their Agro Ecological Distribution and their Impact on the Development of Cattle in Burundi

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Received: October 30, 2022; **Published:** November 22, 2022

Abstract

A study of the ticks collected on the animals of the farms in Burundi was conducted from the period of March 2016 to June 2017. In whole, 1608 ticks were collected on 296 Bovine cattle of different agro ecological zones. We have come up to identify five species of ticks namely: *Rhipicephalus appendiculatus* (86.9%), *Rhipicephalus evertsi eversti* (7.2%), *Boophilus decoloratus* (4.2%), *Amblyomma variegatum* (1.4%) and *Hyalomma truncatum* (0.4%). The *Rhipicephalus appendiculatus* being the main vector of bovine theileriosis is widely spread in the area whereas *Hyalomma truncatum* appears almost inexistent.

Keywords: Distribution; Ticks; Cattle; Burundi

Introduction

Ticks as other electroparasites constitute a great danger to the development of livestock in Burundi as noticed elsewhere in the world [1,2]. Their acarology and their bio ecology have not yet largely studied in Burundi as well as their epidemiology of diseases linked to caprine cattle chewing cud [3]. Ticks are known as responsible of many diseases. They represent an obstacle to the development of bovine cattle in the region [4,5]. Some ticks are specific to bovine cattle and transmit parasitic diseases such as virus bacteria provoking death [6,7]. These parasites are stuck on the skin of host animal. In this survey we are trying to record the different bovine parasites, draw the map of their distribution and therefore determine their impact on the development of cattle with regard to the endemic species.

Materials

Description of the zone of study

Burundi is between 28° 50', 30° 53' longitude East and 4°28' latitude south. It is 27 834 km² and bordered in the North by Rwanda, East Tanzania, West by the Democratic Republic of Congo, in the South West the Tanganyika lake.

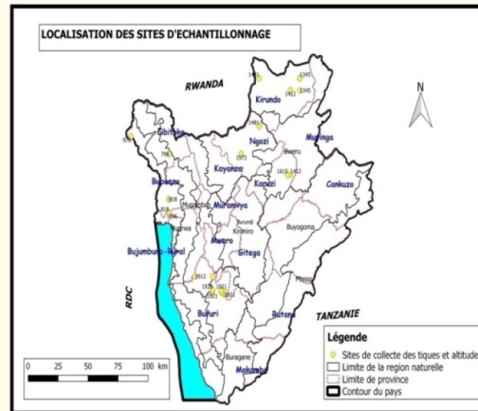


Figure 1: Burundi administrative map.

The country is subdivided in ten traditional regions divided into five agro ecological zone (Table 1). The climate is subtropical humid type with a dry season from June to September and with a rainy season from October to May. A short dry season characterized by a slow down of precipitation in January to February is regularly observed. The climate changes from one zone to another (Table 1). The agricultural activities and the cattle raising vary also from a region to another and are influenced by the climate, the nature of soil, the density and the experience of the local population as well as the socioeconomic factors.

Agro ecological zones	Altitude and climate	Natural regions	Constraint ant assets of bovine cattle
Imbo Valley	<ul style="list-style-type: none"> 700 to 800m Pluviometry < 1000mm per year Medium temperature 23° to 24,2°C 	Imbo Valley	<ul style="list-style-type: none"> Very hot climate characterized by the presence of glasses, vectors of trypanosomiasis This zone harbours Bujumbura city characterized by the presence cattle because of high demand of milk.
The central plateau	<ul style="list-style-type: none"> 1300 to 1500m of altitude pluviometry 1200 to 1600 hear Mean temperature 18° to 21°C 	<ul style="list-style-type: none"> Kirimiro Buyenzi Bweru Buyogoma 	<ul style="list-style-type: none"> High density of population Absence of the natural team space Buyo
West slop of peak	<ul style="list-style-type: none"> 1000 to 1700 of altitude Pluviometry 1000 to 1300mm per year 	<ul style="list-style-type: none"> Munirwa 	<ul style="list-style-type: none"> Poor soil due to erosion for cattle High density of population
Congo Nile The hest of Congo Nile	<ul style="list-style-type: none"> Mean temperature 21° to 23°C 1700 to 2500m of altitude decreasing from the North to the South with a mean altitude of 1 800m Pluviometry: more than 1600mm per year Temperature: 15.8 to 18°C 	Mugambabutu	<ul style="list-style-type: none"> Poor from with eroded the soil Prevalence of Eragrostisolivaceae Potentiality to fodder the cattle and improve the cattle Favorable climate for Bovine cattle. The region harbours 41% of livestock among which 21.2% in the Bututsi.

Table 1: Subdivision of Burundi in different agro ecological zones [8].

Characteristics of cattle and choice of animals for the study

The study was conducted on the bovine cattle kept in the extensive system on 272 bovines either 91.81%, 20 bovines in semi stalling breeding either 6.75% and in strict stalling system on 4 bovines either 1.35%. The bovine cattle was either of improved race of sahiwal hybrids or locale race of Ankole for their sex. 43 bovines were sex male both 14.6% and 253 of female sex either 85.5. These bovines were all of 3.16 years medium.

Collect of ticks, conservation and identification

Ticks were collected at random on the cattle. Our attention was drawn on cattle presenting ticks. They were extracted using forceps and placed in a tin containing the ethanol at 7% having a label indicating the date of collect had been operated. Every bottle presented an environment of conservation containing 70% of chloroform [9,10]. The glycerol permits to avoid the drying of ticks when they are examined in free air. The chloroform attempts the loss of color of ticks [11] to identify ticks we placed them in bottles or flagon which we shopped drops of formol. Ticks are killed to facilitate the identification in the laboratory of veterinary entomology in the Centre of Research Natural Sciences of Lwiro (C.R.S.N-Lwiro) in the Republic Democratic of Congo following the morphological criteria [9].

To determine the specimens, we use the key of [12-15]. The key are confirm to ticks of the tropical African region. The identification was effected by the morphology comparison of collected ticks to those contained different keys and also to the specimens kept in laboratory of entomology dating from 1970 up today.

Statistical analyses

The data were dealt with by using Excel logiciel 2007. The different comparisons between the species since the packing at the site and species by ticks were effected.

Results and Discussion

The species of collected ticks

We have collected in Burundi 5 species according to their intensity and number of individuals per species, we noted:

- *Rhipicephalus appendiculatus*
- *Rhipicephalus evertsi evertsi*
- *Boophilus decoloratus*
- *Amblyomma variegatum*
- *Hyalomma truncatum*

The following table 2 presents in detail the number per species and their percentage.

Charge of ticks for every altitudinal bovine for the agro ecological sites, 1608 was picked on 296 bovines with parasite charge of 4.5 ticks per bovine. These results are far different from those found in the Republic Democratic of Congo in South Kivu province, where the charge of ticks per bovine amounted at 71 [10] and those obtained in North Kivu Province by Kalume in 2012 72 ticks per bovine. The reduction of the charge of ticks was dictated by the fact that the collect was done the day after the spraying of acaricide on the bovine. That proved that ticks were numerous dead and we did collect only the resistant ticks to the acaricide product.

n°	Species	Number of ticks by species	Percentage
1	<i>Rhipicephalus appendiculatus</i>	1398	86.9%
2	<i>Rhipicephalus evertsi evertsi</i>	116	7.2%
3	<i>Boophilus decoloratus</i>	68	4.2%
4	<i>Amblyomma variegatum</i>	23	1.4%
5	<i>Hyalomma truncatum</i>	3	0.2%

Table 2: The species of ticks along with their prevalence.

N°	Sites	Altitude in meters	Number of cattle	Charge in ticks per cattle
1	Brass	796	30	1.2
2	Genius	818	15	1.6
3	God	976	60	1.2
4	The mountain	1345	38	1.3
5	Go to sleep	1412	12	0.7
6	Distracted	1481	14	1
7	Right	1573	16	0.5
8	Ishanga	1615	53	1
9	Poison	1912	10	0.2
10	Matana	1920	15	0.8
11	Gisarendu	1921	33	0.5

Table 3: Charge in ticks per bovine with regard to the altitude.

Distribution of ticks according to altitude and their impact

The altitudinal repartition of ticks was never regarding the site and the three agro ecologic zones. According to this study, the frequency and charge in ticks recede as far as you go up. The site such as Buringa, Gihanga, Ruhanga, know a higher charge in ticks than the middle and high altitude. Five species of ticks were collected there although they were of different frequencies. However, the *Hyalomma truncatum* species was rare with only one individual in the three agro ecologic zones. As for the other species, *Rhipicephalus appendiculatus* 796, *Rhipicephalus evertsi evertsi* 21, *Boophilus decoloratus* 15 and *Amblyomma variegatum* 2.

In the medium agro ecologic zones of Nyangisozi, Burara, Marangara and Maruri the charge in ticks lowered from 1 to 0.7 ticks per bovine. Five species of ticks were identified there at different frequencies between them.

As for *Hyalomma truncatum*, one individual was picked up whereas the other were represented as following:

- *Rhipicephalus appendiculatus* 75
- *Rhipicephalus evertsi evertsi* 7
- *Boophilus decoloratus* 8
- *Amblyomma variegatum* 13.

In the third agro ecologic zone, mainly Isahango, Butwe, Matana and Gisarenda the charge in ticks tends to be null and species disappears completely on 5 species, a reduced number for four species was observed, and one species disappeared in the area. Then the repartition of tick individual with regard to species and altitude was presented as following:

- *Rhipicephalus appendiculatus* 111
- *Rhipicephalus evertsi evertsi* 1
- *Boophilus decoloratus* 5
- *Amblyomma variegatum* 0
- *Hyalomma truncatum* 1.

Considering that precedes, we note that our results differ from one agro ecologic zone to another.

Abundance of species per site and altitude (Table 4).

Altitude in meters	796	818	976	1345	1412	1481	1573	1615	1912	1920	1922
<i>Boophilus discoloratus</i>	5	7	2	7	0	5	1	0	0	1	4
<i>Rhipicephalus appendiculatus</i>	25	15	51	37	10	13	7	47	1	12	0
<i>Rhipicephalus was overthrown</i>	6	2	11	2	3	1	1	2	1	0	14
<i>Hyalomma truncatum</i>	0	0	1	0	0	0	0	1	0	0	1
<i>Amblyomma variegatum</i>	0	1	1	9	0	0	0	4	0	0	0
Total 796	36	25	66	55	13	19	9	54	2	13	19

Table 4: Frequency of tick species.

Similar surveys had been conducted in the Democratic Republic of Congo in the North Kivu province. These studies proved that the bovine theileriosis was transmitted by the *Rhipicephalus appendiculatus*. However, the Anaplasmosis (35.5%), the Babesiosis (16.2%) were caused by *Boophilus decoloratus* ticks. A cross feed survey realized on 29 bovine stock live in Lubero-Beni show that *Rhipicephalus appendiculatus* vectors known as linked to *Theileria parva* is prevalent in the area (64.3%) followed by *Boophilus decoloratus* (35.5%) and *Amblyomma variegatum* (0.3%) [17,18]. The diseases transmitted to animal by ticks cause a lot of harm, they represent a great handicap to the development of cattle in the area [19].

The impact of ticks on bovine cattle on their growth and milk production

The study had been conducted on 5 locale heifers (Ankole), 5 intermediary heifers (Hybrids) and 5 improved races (Ankole) The witness samples were carried on 5 heifers cleaned from ticks, 5 heifers with tick parasites but treated, 5 unsprayed heifers.

The spraying was affected every 15 days.

This table showed a clear negative impact of ticks on the growth, weight and production of cattle [21].

This table shows how ticks cause a lot harm to the production of milk due to their blood plundering, the diseases they transmit to cattle and the stresses they raise and worse than these they cause mortality up to 63% [19,23].

N°	Bovine weight development		
	Without parasites	Parasite on sprayed	Unsprayed parasite
1	400-650	380-420	270-310
2	700-820	650-783	430-538
3	850-1015	730-842	550-597

Table 5: Weight variation offer a year.

Ankole bovine race			Hybrid bovine			Improved race		
Without parasite	Treated parasite	No treated	Without parasite	Treated parasite	Untreated parasite	Without parasite	Treated parasites	Untreated parasites
1,6-3l	0,3-1,2-	0,5-5l	3-5l	2-4l	2-3l	8-12l	7-9l	4-6l

Table 6: Milk production variation in cattle infested with ticks per day.

Conclusion

The study has shown that the *Rhipicephalus appendiculatus* ticks are widespread in Burundi bovine cattle and cause a lot of damages among the livestock with regard to diseases they transmit. Apart from the diseases, they cause stresses to animals due to their biting, they inject neurotoxin, virus, Bacteria, and even protozoan. The Bovine breeder need to be informed about the risk inherent to the presence of these ticks and therefore trained to treat their cattle. The following protocol has been proposed:

- To restore a service of acaricide bath accessible to the breeders.
- To supply regularly acaricide products by the presence of a veterinary dispensary.
- To pursue the study of parasitology and serology of ticks to draw a map on ticks infestation.

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Volume 7 Issue 12 December 2022

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