



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2026; 11(1): 109-116

© 2026 VET

www.veterinarypaper.com

Received: 09-10-2025

Accepted: 19-11-2025

Dieudonné Moubamba Mbina

Institut de Recherche

Agronomique et Forestière, BP.

2246, Libreville, Gabon

Lin-Sosthène Soumbou

Institut de Recherches

Technologiques, PB. 9154,

Libreville, Gabon

Kouri, Goudali and Bororo cattle from Cameroon real vehicles that introduce ticks of the ixodidae family into Gabon

Dieudonné Moubamba Mbina and Lin-Sosthène Soumbou

DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i1b.2932>

Abstract

In order to identify the cattle breeds from Cameroon imported by Gabon as well as the species of ticks from the Ixodidae family that infest these ruminants, 157 cattle aged between 5 and 6 years underwent a morphological examination over a period of 12 months, and the same was done for the ticks collected from these ruminants. The Goudali zebu (83%) and Bororo (16%) and the Kouri cattle (1%) are the three cattle breeds that introduce the tick species *Rhipicephalus* (*Boophilus*) *decoloratus* (65.18%), *Amblyomma variegatum* (30.45%), *Rhipicephalus lunulatus* (1.46%), *Rhipicephalus simpsoni* (0.62%), *Hyalomma truncatum* (2.09%), and *Hyalomma impeltatum* (0.2%) in Gabon. Of all the tick populations studied, the first two species were the most significantly abundant ($p < 0.0033$). These arthropods pose a real risk of introducing zoonoses and emerging diseases, with cattle serving as the vehicles for their introduction into Gabon.

Keywords: Ticks, cattle, zoonoses, arthropods, Ixodidae

1. Introduction

Cross-border livestock movements (Davies *et al.*, 2020) ^[1] are associated with several factors such as livestock transhumance related to transboundary pastoralism, which is nothing more than the result of the use of resources derived from the sustainable management of pastures between countries sharing common borders. In addition to this pastoralism, another factor to consider is the existence of conflicts that force herds to move from conflict zones to peaceful grazing areas located beyond national borders. Finally, the last factor to mention is cross-border livestock trade, which involves the sale of animals to states outside the national territory from which the animals sold originate (Davies *et al.*, 2020) ^[1]. All these factors are responsible for the exchange of diseases and disease vectors such as ticks between countries that have animal flow exchanges. In the case of Cameroon and Gabon, it is the last factor, namely cross-border cattle trade, that interests these two countries, since every year several thousand ruminants from Cameroon (Pref-Cemac, 2022) ^[2] are sold to Gabon and introduce ticks (Moubamba, 20060) ^[3]. The cattle breeds that serve as vehicles for these arthropods have never been characterized, and the same is true of the ticks that these ruminants introduce into Gabon. The objective of this publication was to identify both the cattle breeds that introduce ticks into Gabon and to characterize the ticks they carry on their bodies when they reach their destination, then to present the potential diseases that these arthropods can introduce into this country.

2. Material and methods

2.1 Study site

The commune of Owendo is located southern the city of Libreville, the capital of Gabon. Its climate is warm and humid, with an average annual rainfall of 2.503 mm per square meter. The average annual temperature and humidity are 26 °C and 85%, respectively. The economic activities of this municipality are focused on the port, fishing, the timber industry,

Corresponding Author:

Dieudonné Moubamba Mbina

Institut de Recherche

Agronomique et Forestière, BP.

2246, Libreville, Gabon

construction, railways, and shipbuilding. This commune is home to the slaughterhouse where information on livestock and ticks from Cameroon was collected.

2.2 Cattle of the Survey

157 cattle from Cameroon between 5 and 6 years old took part in this study conducted between August 2018 and August 2019. These animals had not received any tick treatment from arrival until the date of their slaughter. The characterization of the cattle was carried out using information from Cameroonian butchers working at the Libreville slaughterhouse and then confirmed by pictures, publications and technical sheets describing the morphological features of the animals studied.

2.3 Sampling and identification of ticks

Since the sample size n chosen for this study was small, the Cochran equation was the appropriate tool for calculating the sample size. The formula for this equation was therefore:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

n : Sample size

n_0 : Number of cattle scheduled for slaughter on the day from which n animals were sampled once a month

N : The total number of cattle in the slaughterhouse from which n animals were sampled 12 times during the year

Tick sampling was carried out once a month and included n animals randomly sampled from 40 cattle scheduled for slaughter that day; therefore, sampling was carried out 12 times from $N = 480$ animals over a 12-month periods. The social science statistics calculator determined the value of the sample size n by taking into account, in the calculation, the 95% confidence interval estimate, the 20% precision level and the value of 0.2 of the estimated proportion. Finally, the sample size of animals sampled monthly was $n = 13$ cattle, this value made it possible to determine the number of 157 cattle from which ticks were collected during the entire study. The arthropods collected were put in 10 ml vials containing 70% ethanol and then transported to the laboratory for identification. A binocular microscope and tick identification keys (Rageau, 195)⁴; (Walker *et al.*, 2003)^[5] were used to characterize these arthropods. The relative frequencies of the identified tick species were evaluated as percentages.

2.4 Statistical analysis

A statistical calculator which had the Kruskal wallis and Bonferroni tests from the website: Statistics kingdom (Statistics Kingdom, 2017)^[6] was used to compare relative frequencies between tick species. The confidence interval of the test was estimated at 95% and its significance threshold was set at 0.05 for the Kruskal Wallis test and at 0.003 for the Bonferroni test. Relative frequencies were significantly different when $p < 0.05$, they were not when $P > 0.05$. For the Bonferroni test, in a given pair of frequencies, the frequencies were different when $p < \alpha$ (0.0033), they were not different when $P > \alpha$ (0.0033).

The Social Science Statistics calculator (Social Science Statistics, 2025)^[7] was also used to determine the sample size of n animals from 40 cattle from which ticks were collected once a month at the Owendo slaughterhouse. The 95% confidence interval, the 20% precision level, and the estimate proportion of 0.2 were used to estimate the monthly sample

size n animals.

3. Results

3.1 Identification of cattle breeds

Three bovine breeds were identified during this study (Fig.1). They are the Adamaoua or Goudali Foulbe zebu (*Bos indicus*) (Fig.2) and the Bororo zebu (Fig. 3). The only taurine breed (*Bos taurus*) (Fig. 4) characterized during these observations belonged to the Kouri breed. The figure 1 shows the distribution of the relative frequencies of the bovine breeds involved in this survey, with Goudali, Bororo, and Kouri cattle representing 83%, 16%, and 1% of the total population, respectively.

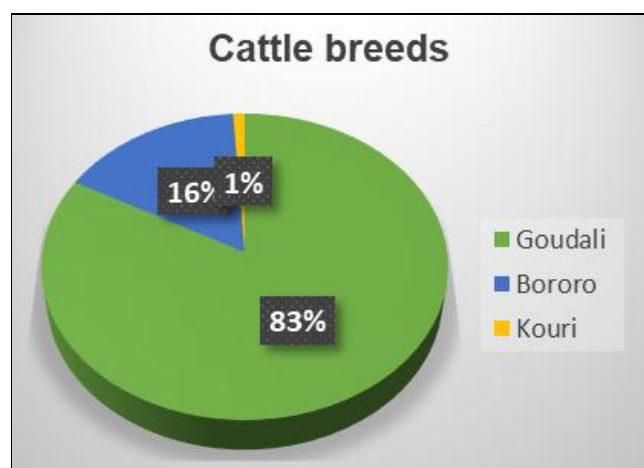


Fig 1: Relative frequencies of cattle breeds



Fig 2: Goudali zebu



Fig 3: Bororo zebu



Fig 4: Kouri Taurine

3.2 Characterized tick species

Six species of ticks were identified during observations performed on ticks collected from cattle imported from Cameroon (Fig. 5), among which were *Rhipicephalus (Boophilus) decoloratus* (65.18%) (Fig. 6), *Amblyomma*

variegatum (30.45%) (Fig. 7), *Hyalomma truncatum* (2.09%) (Fig. 8), *Rhipicephalus lunulatus* (1.46%) (Fig. 9), *Rhipicephalus simpsoni* (0.62%) (Fig. 10), and *Hyalomma impeltatum* (0.2%) (Fig. 11).

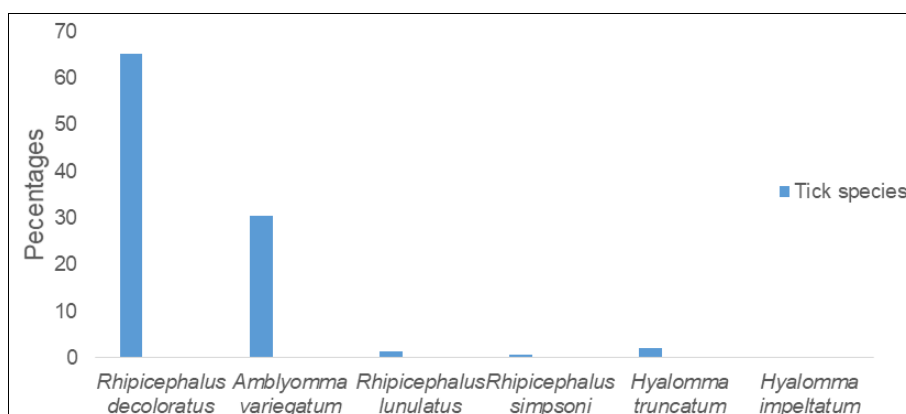


Fig 5: Relative frequencies of tick species

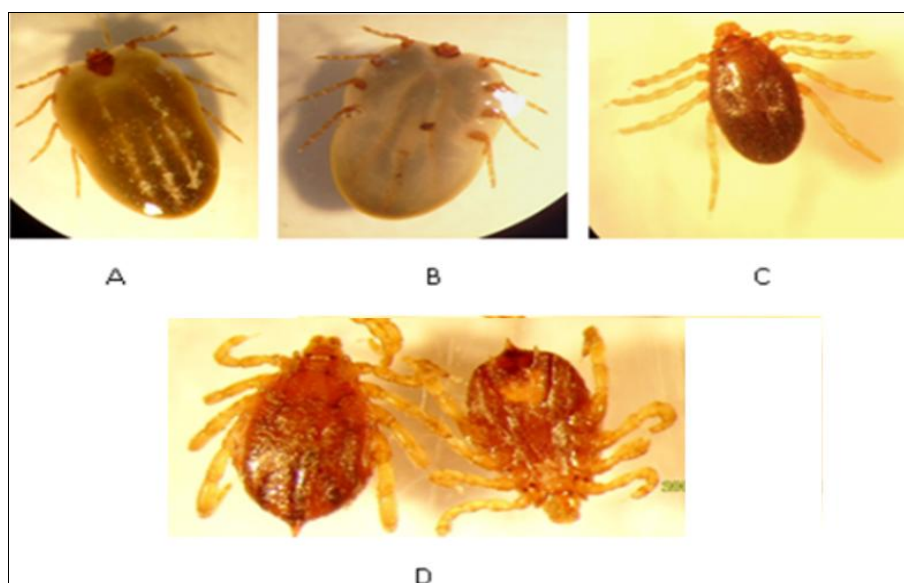


Fig 6: *Rhipicephalus (Boophilus) decoloratus* Female (A) dorsal view and (B) ventral view, (C) non engorged Female, Male (D) dorsal and ventral view



Fig 7: (A) Female *Amblyomma variegatum*, (B) Male *Amblyomma variegatum*

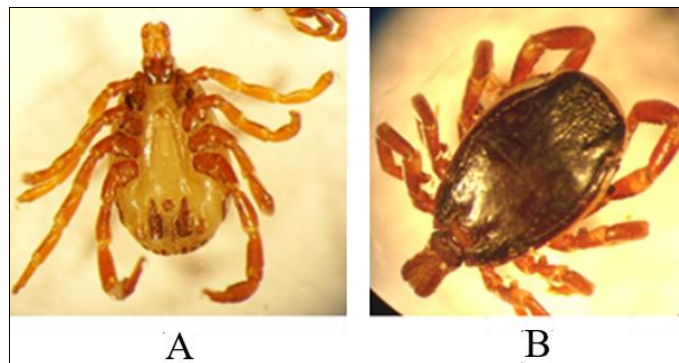


Fig 8: Male *Hyalomma truncatum*, (A) ventral view, (B) dorsal view

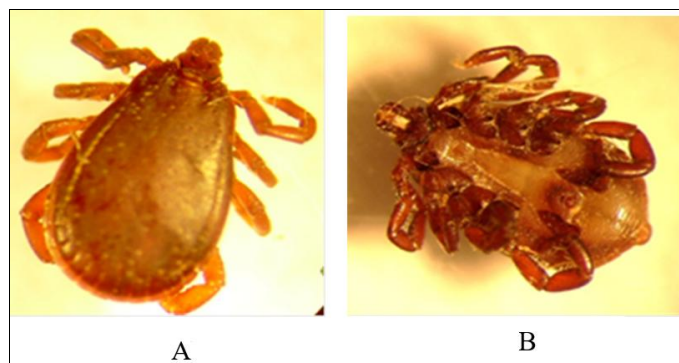


Fig 9: Male *Rhipicephalus lunulatus* (A) dorsal view, (B) ventral view



Fig 10: Female *Rhipicephalus simpsoni*



Fig 11: Male *Hyalomma impeltatum*

3.3 Comparison of relative frequencies of tick species

The relative frequencies of tick species infesting Cameroonian cattle imported into Gabon have been the

subject of a comparative study with the Kruskal-walis test, and the results obtained are presented in the Table 1

Table 1: Comparison of relative frequencies of tick species using the Kruskal Wallis test

Tick species	N	Means	%	Freedom of liberty	X2	P-value	P
<i>Amblyomma variegatum</i>	12	56.42	30.45	5	53.1	0.000*	0.05
<i>Rhipicephalus (Boophilus) decoloratus</i>		64.54	65.18				
<i>Rhipicephalus lunulatus</i>		27.58	1.46				
<i>Rhipicephalus simpsoni</i>		23.00	0.62				
<i>Hyalomma truncatum</i>		28.79	2.09				
<i>Hyalomma impeltatum</i>		18.67	0.2				

* Significant difference because $P\text{-value} < P$ ($0.000 < 0.05$).

H0 (Null hypothesis): The means of the tick species groups infesting imported cattle from Cameroon are the same with a $P\text{-value} > 0.05$, the null hypothesis is rejected. H1 (Alternative Hypothesis): At least one group of tick species that infest cattle imported from Cameroon has a different

mean from the other groups, so the alternative hypothesis is accepted because the $P\text{-value} < 0.05$

The Dunn and Bonferroni test was used as a post-hoc test after the Kruskal-Wallis test, and the results of this test are contained in Table 2.

Table 2: Dunn/Bonferroni test used as a post-hoc test to compare tick species groups 2 by 2

Pair groups	Mean rank difference	Z	SE	Critical value	P-value	Alpha
<i>A.variegatum</i> - <i>Rh.decoloratus</i>	-8.125	0.9807	8. 2846	24.3173	0.1634	0,0033
<i>A.Variegatum</i> - <i>Rh. Lunulatus</i>	28.8333	3.4803			0.0002504*	
<i>A. Variegatum</i> - <i>Rh. Simpsoni</i>	33.4167	4.0336			0.00002747*	
<i>A.variegatum</i> - <i>H. truncatum</i>	27.625	3.3345			0.0004273*	
<i>A.variegatum</i> - <i>H. impeltatum</i>	37.75	4.5566			0.00000260*	
<i>Rh.decoloratus</i> - <i>Rh. Lunulatus</i>	36.9583	4.4611			0.00000408*	
<i>Rh.decoloratus</i> - <i>Rh. Simpsoni</i>	41.5417	5.0143			2.661e-7*	
<i>B. decoloratus</i> - <i>H. truncatum</i>	35.75	4.3152			0.000007972*	
<i>B.decoloratus</i> - <i>H.impeltatum</i>	45.875	5.5374			1.535e-8*	
<i>Rh.lunulatus</i> - <i>Rh.simpsoni</i>	4.5833	0.5532			0.2901	
<i>Rh.lunulatus</i> - <i>H.truncatum</i>	-1.2083	0.1459			0.442	
<i>Rh.lunulatus</i> - <i>H.impeltatum</i>	8.9167	1.0763			0.1409	
<i>Rh.simpsoni</i> - <i>H.truncatum</i>	-5.7917	0.6991			0.2422	
<i>Rh.simpsoni</i> - <i>H.impeltatum</i>	4.3333	0.5231			0.3005	
<i>H. Truncatum</i> - <i>H.impeltatum</i>	10.125	1.2221			0.1108	

*Significant difference because $P\text{-value} < \text{Alpha}$ ($P\text{-value} < 0.0033$)

Among Ticks imported from Cameroon, *Rhipicephalus (Boophilus) decoloratus* (65.18%) had the highest relative frequency of all species, followed by *Amblyomma variegatum* (30.45%), with the lowest percentage observed in

Hyalomma impeltatum (0.2%); however, the Dunn and Bonferroni test (Table 2) showed that *Rhipicephalus (Boophilus decoloratus)* and *Amblyomma variegatum* were the significantly most numerous tick species in the studied

tick population (P-value < 0.003), between these 2 species neither was significantly more numerous than the other (P-value > 0.003)

3. Discussion

This study showed that the Peul zebu of Adamaoua or Gudali, the Bororo zebu and the Kuri taurines are the three cattle breeds originating from Cameroon, introduced to Gabon through cross-border cattle trade. The first two breeds come from the Adamaoua region, located between the Northern, Central, and Eastern regions of Cameroon, while the last breed originates from the Lake Chad region (Minepat, 2018) [8]. The Goudali breed, is of medium size and has a pendulous hump. Its profile is slightly convex. Its elongated and narrow head is attached to a rather short neck. The size of the horns varies from short to medium. This animal is a meat-type zebu (Lhoste, 1969) [9]. Concerning Bororo cattle, these ruminants are large animals with long legs, their long head has long lyre-shaped horns, the neck of these animals is long and made up of poorly developed muscles, the sloping rump of these cattle is not sufficiently covered (Lhoste, 1969) [9]. This breed includes two varieties or types: the Djafoun or Bororo red variety, whose coat is mahogany; the second and last type is called Bororo white or Akou, whose coat can be white with black pigmentation or speckled with black (Lhoste, 1969) [9]. Bororo cattle are animals with a relatively undeveloped conformation, breed for slaughter, but robust and well-suited to long walks, making them good animals for transhumance. In Kouri cattle, the horns can have unusual shapes, ranging from swollen to pumpkin-shaped (Tawah *et al.*, 1997) [10]. The coat color of these cattle can be white, light gray, speckled with black, or gray-black. The weight of these animals varies between 550 kg and 700 kg. It is a good pack animal. Of these three cattle breeds, the Bororo zebu has the lowest meat yield, at only 41% (Assani Seidou, 2013) [11], compared to 51% (Assani Seidou, 2013) [11] and 48% (Bourzat, 1996) [12] for the Goudali and Kuri breeds, respectively. Cattle imported from Cameroon are primarily destined for the markets of Libreville, the capital of Gabon, to meet the considerable protein needs of the city's population, which alone accounts for 59% of the country's population (Africapolis, 2020) [13]. These animals enter Gabon by land through the border with Cameroon.

Regarding ticks and the diseases associated with them, the six species collected on cattle imported from Cameroon belonged to the Ixodidae family, as they had a carapace or festoon on their back (Walker *et al.*, 2003) [5]. The species *Amblyomma variegatum*, *Hyalomma truncatum*, and *Hyalomma impeltatum* were classified in the longirostrata tick group, as they have long mouthparts, while the three other species belonging to the *Rhipicephalus* genus were placed in the brevirostrata tick group, as they have short mouthparts (Busséras and Chermette, 1991) [14]. *Rhipicephalus* (*Boophilus*) *decoloratus* is a tick species that was long classified in the genus *Boophilus*, but recent phylogenetic studies have led to the reconsideration of the genus *Boophilus* as a subgenus of the genus *Rhipicephalus* (Murrell *et al.*, 2023) [15]. However, *Boophilus* ticks are arthropods whose developmental cycle is monoxenous, unlike other ticks of the genus *Rhipicephalus*, which have a dixenous or trixenous cycle (Sungirai *et al.*, 2017) [16]. In sub-Saharan Africa, this arthropod, whose main hosts are cattle, transmits babesiosis caused by *Babesia bigemina* to these animals, just as two other species of the same subgenus, namely *Rhipicephalus* (*Boophilus*) *annulatus* and *Rhipicephalus* (*Boophilus*)

microplus, also transmit the same pathogen to the same animals in addition to *Babesia bovis* (Kazereka, 2012) [17]. *Rhipicephalus decoloratus* is present in Gabon (Pourrut *et al.*, 2011) [18], so its introduction into this country by cattle from Cameroon is not surprising; moreover. *Rhipicephalus decoloratus* has been reported in Pakistan, where this tick was collected from buffaloes and cattle (Sabir *et al.*, 2024) [19], and it is believed to be involved in the transmission of *Babesia bovis* and *Anaplasma centrale* to these animals, as both pathogens have been detected in these arthropods and in the blood of these large ruminants in this country. Of the six tick species studied, this arthropod was significantly the most abundant and infested Cameroonian zebu cattle imported into Gabon. *Amblyomma variegatum* was also collected in large numbers from Cameroonian cattle. Of the six tick species studied, it was the most significantly predominant species after *Rhipicephalus decoloratus*. This arthropod has a trixenous cycle that requires three hosts for the larvae to reach the adult stage. Domestic and wild ruminants, antelopes, and gazelles are its hosts (Walker *et al.*, 2003) [5]. Its range extends from the Sahel to Mozambique, Madagascar, and Réunion. Like *Rhipicephalus decoloratus*, this arthropod has reached Asia, specifically Pakistan (Sabir *et al.*, 2024) [19]. *Amblyomma variegatum* is one of the main vectors for the transmission of the bacterium *Ehrlichia ruminantium* to ruminants. *Amblyomma variegatum* also transmits *Anaplasma bovis*, which causes bovine ehrlichiosis in cattle and buffalo (Deepak *et al.*, 2017) [20]. Massive infestations of *Amblyomma variegatum* in cattle also lead to the development of dermatophilosis caused by the bacterium *Dermatophilus congolensis* (Walker and Lloyd, 1993) [21]. *Amblyomma variegatum* is an aggressive and anthropophilic tick that harbors *Rickettsia africae* and transmits ATBF (African tick Bite fever) to humans, the symptoms are similar to those of malaria and can create confusion between these diseases (Ndip *et al.*, 2004) [22]. *Rhipicephalus lunulatus* is another tick species, first collected from imported cattle from Cameroon entering Gabon. So far, no publication has mentioned its presence in this country. It is a tick with a trixenous cycle, whose distribution range extends from Senegal to Somalia, as well as to the south of the continent. Cattle, sheep, and dogs are the preferred hosts of this arthropod. The vector status of this arthropod in disease transmission is not well established but through its bites, *Rhipicephalus lunulatus* causes paralysis in animals (Walker *et al.*, 2003) [5]. *Rhipicephalus simpsoni* is also a tick species from the Ixodidae family that was studied during our research. This arthropod is a trixenous tick. Its range is linked to that of its main host, the grasscutter (Morel and Mouchet, 1965) [23] and extends south of the Sahara on the African continent. Furthermore, it has been shown that the grasscutter harbors *Babesia sp* in its blood (Opara, 2010) [24]. It is therefore possible that *Babesia microti* is among these piroplasms, but research on the detection of this pathogen must be conducted in *Rhipicephalus simpsoni*. To date, no publication has demonstrated that this arthropod is a vector of *Babesia microti*, which usually infests rodents but is also pathogenic to humans (Yang *et al.*, 2021) [25]. *Hyalomma truncatum* was among the tick species identified in this study; it was the first time that the presence of this tick had been reported in Gabon. This arthropod has a two-host life cycle. Large herbivores are its preferred hosts, but this tick can also attach to dogs to feed. Immature stages infest can also attach to humans. *Hyalomma truncatum* is widespread south of the Sahara (Walker *et al.*, 2003) [5]. This tick transmits Crimean-Congo hemorrhagic fever to humans. The mortality rate of

this disease in humans varies between 10% and 40% (Who, 2025) ^[26]. This publication also reported for the first time the introduction of *Hyalomma impeltatum* in Gabon through Cameroonian cattle imports. This arthropod has a trixenous cycle, it is a tick from arid and semi-arid regions (Zakham *et al.*, 2021) ^[27]. Adult forms often infest cattle and camels, while immature stages feed on rodents and birds. This tick is also a vector of the Crimean-Congo hemorrhagic fever virus (Camicas *et al.*, 1990) ^[28]. It also carries the Alkhumra (KL) virus, which causes hemorrhagic fever in humans, with a mortality rate between 1% and 25% (Srivastava *et al.*, 2024) ^[29]. This arthropod also harbors the West Nile virus, which has already been detected in Gabon in a Goudali zebu (Maganga *et al.*, 2021) ^[30]. Of these 2 species of ticks, *Hyalomma truncatum* is more widespread in semi-arid regions than in dry regions, unlike *Hyalomma impeltatum*, which lives in both types of environments. The supposed presence of the first species mentioned in humid regions is due to a confusion of this species with *Hyalomma nitidum* (Walker *et al.*, 2003) ^[5].

4. Conclusion

This study showed that Goudali, Bororo, and Kouri cattle originating from Cameroon are vehicles that introduce ticks of the Ixodidae family to Gabon, namely: *Rhipicephalus (Boophilus) decoloratus*, *Amblyomma variegatum*, *Rhipicephalus lunulatus*, *Rhipicephalus simpsoni*, *Hyalomma truncatum*, and *Hyalomma impeltatum*. The first two species were significantly the most abundant. Among these tick species, those of the genus *Hyalomma* are arthropods that usually live in arid and semi-arid regions, Gabon therefore constitutes an environment that is not conducive to the completion of their development cycle. Among all these tick species, *Amblyomma variegatum*, *Hyalomma truncatum*, and *Hyalomma impeltatum* are the only ones to exhibit anthropophilic behavior. The introduction of these arthropods into Gabon poses a threat to public and animal health. The identification of tick species introduced into Gabon by cattle from Cameroon must be completed, by researching pathogens in these arthropods

4. Acknowledgments

Our acknowledgements to Dr. Alan Walker of University of Edinburgh for confirming tick species identification collected from Cameroonian cattle and also to AGASA Agence Gabonaise de la sécurité alimentaire, the agency in charge of the management of the slaughterhouse where a part of this work was conducted

5. Conflict of Interest

No conflicting interest to declare.

References

1. Davies J, Ogali C, Slobodian L, Roba G, Ouédraogo R. Crossing borders: legal and policy frameworks for transboundary pastoralism. Rome: Food and Agriculture Organization of the United Nations and International Union for Conservation of Nature; 2020. p. 10-25.
2. Programme des Réformes Économiques et Financières de la CEMAC. Stratégie d'import substitution des biens de cru produits dans la CEMAC. Yaoundé: CEMAC; 2022. p. 16-23. Available from: https://pref-cemac.org/img_documents/document589/strat-gie-d-import-substitution-des-biens-de-cru-produits-dans-la-cemac-septembre-2022-.pdf
3. Moubamba D. Identification et distribution des espèces de tiques qui infestent les chiens à Libreville. Annales de Médecine Vétérinaire. 2006;150:193-196.
4. Rageau J. Clés pour l'identification des tiques du Cameroun. Annales de Parasitologie Humaine et Comparée. 1953;28:5-6.
5. Walker AR, Bouattour A, Camicas JL, Estrada-Peña A, Horak IG, Latif AA, Pegram RG, Preston PM. Ticks of domestic animals in Africa: a guide to identification of species. 2nd ed. Edinburgh: Bioscience Reports; 2003. p. 63-184.
6. Statistics Kingdom. Statistical calculators online. 2017 Nov. Available from: <https://www.statskingdom.com/>
7. Social Science Statistics. Sample size calculator. 2025. <https://www.socscistatistics.com/tests/samplesize/default.aspx>
8. Ministère de l'Économie, de la Planification et de l'Aménagement du Territoire. Élaboration du schéma régional d'aménagement et de développement durable du territoire de l'Adamaoua: atlas cartographique de l'Adamaoua. 2nd ed. Yaoundé: MINEPAT; 2010. p. 34-51. <https://documents1.worldbank.org/curated/en/364731468233038110/pdf/E23260REVISED01AFR1EA1P1129751Final.pdf>
9. Lhoste P. Les races bovines de l'Adamaoua. Wakwa: Institut d'Élevage et de Médecine Vétérinaire des Pays Tropicaux; 1969. p. 3-6.
10. Tawah CL, Rege JEO, Aboagye GS. A close look at a rare African breed: the Kuri cattle of Lake Chad Basin—origin, distribution, production and adaptive characteristics. South African Journal of Animal Science. 1997;27:31-40.
11. Assani Seidou A. Typology and productivity of Zebu Gudali herds located in the communes of Malanville and Karimama, North Benin [Agricultural Engineer thesis]. Parakou: University of Parakou; 2013. p. 4-13.
12. Bourzat D. Livestock atlas of the Lake Chad Basin. Montpellier: CIRAD-EMVT; 1996. p. 89-90.
13. Africapolis. Visualise urbanisation in Africa: Gabon country report. 2024. <https://africapolis.org/en/countries/country-report>
14. Bussiéras J, Chermette R. Abrégé de parasitologie vétérinaire: parasitologie générale. Paris: École Nationale Vétérinaire; 1991.
15. Murrell A, Barker SC. Synonymy of *Boophilus* Curtice 1891 with *Rhipicephalus* Koch 1844 (Acari: Ixodidae). Systematic Parasitology. 2003;56:169-172. doi:10.1023/B:SYP.0000003802.36517.A0
16. Sungirai M, Abatih EN, Moyo DZ, De Clercq P, Madder M. Shifts in the distribution of ixodid ticks parasitizing cattle in Zimbabwe. Medical and Veterinary Entomology. 2017;31:78-87.
17. Kazereka K. Épidémiologie et contrôle de la theilériose bovine à *Theileria parva* dans la province du Nord-Kivu [PhD thesis]. Liège: University of Liège; 2012. p. 7-8.
18. Pourrut X, Emane KA, Camicas JL, Leroy E, Gonzalez JP. Contribution to the knowledge of ticks (Acarina: Ixodidae) in Gabon. Acarologia. 2011;51:465-471. doi:10.1051/acarologia/20102028
19. Sabir H, Abra H, Muhammad UA, Bolin S, Jehan Z, Moutailler S, Foucault-Simonin A, Smith RL, Cabezas-Cruz A, George D, Sparagano O. Exploring the coinfection and genetic diversity of multiple tick-borne pathogens in livestock populations of Punjab, Pakistan.

- Transboundary and Emerging Diseases. 2024;2024:9958535. doi:10.1155/2024/9958535
20. Deepak D, Preena P, Yadav S, Mukherjee MR, Dixit SK. *Anaplasma bovis* (*Ehrlichia bovis*) infection in a buffalo: a case report. International Journal of Livestock Research. 2017;7(1):130-132. DOI:10.5455/ijlr.20170129075733
 21. Walker AR, Lloyd CM. Experiments on the relationship between feeding of the tick *Amblyomma variegatum* (Acari: Ixodidae) and dermatophilosis skin disease in sheep. Journal of Medical Entomology. 1993;30(1):136-143. DOI:10.1093/jmedent/30.1.136
 22. Ndip LM, Bouyer DH, Travassos Da Rosa APA, Titanji VPK, Tesh RB, Walker DH. Acute spotted fever rickettsiosis among febrile patients in Cameroon. Emerging Infectious Diseases. 2004;10(3):432-437. DOI:10.3201/eid1003.020713
 23. Morel PC, Mouchet J. Les tiques du Cameroun (Ixodidae et Argasidae) (2e note). Annales de Parasitologie Humaine et Comparée. 1965;40:477-496.
 24. Opara MN. The grasscutter: a livestock of tomorrow. Journal of Forestry Research. 2010;4:119-135.
 25. Yang J, Smith C, Battad A. *Babesia microti* acquired in Canada. Canadian Medical Association Journal. 2021;193(41):E1606-E1610.
 26. World Health Organization. Crimean-Congo haemorrhagic fever: key facts. 2025 Feb 20. <https://www.who.int/news-room/fact-sheets/detail/crimean-congo-haemorrhagic-fever>
 27. Zakham F, Albalawi AE, Alanazi AD, Nguyen PT, Alouffi AS, Alaoui A, Sironen T, Smura T, Vapalahti O. Viral RNA metagenomics of *Hyalomma* ticks collected from dromedary camels in Makkah Province, Saudi Arabia. Viruses. 2021;13:1396.
 28. Camicas JL, Wilson ML, Cornet JP, Digoutte JP, Calvo MA, Adam F, Gonzalez JP. Ecology of ticks as potential vectors of Crimean-Congo hemorrhagic fever virus in Senegal: epidemiological implications. In: Archives of Virology Supplement. 1990;11:303-322.
 29. Srivastava A, Mahilkar S, Upadhyaya CP, Mishra PK, Raj RM, Sonkar SC. Alkhumra hemorrhagic fever virus: a concise overview. Yale Journal of Biology and Medicine. 2024;97:505-514.
 30. Maganga GD, Ndong Mbale TG, Goussingou Mackaya T, Moubamba Mbina D. Surveillance des agents pathogènes d'origine virale, bactérienne et parasitaire chez des bovins importés au Gabon pour la consommation: une étude en abattoir. Bulletin de l'Académie Vétérinaire de France. 2021;174:286-293.

How to Cite This Article

Mbina DM, Soumbou LS. Kouri, Goudali and Bororo cattle from Cameroon real vehicles that introduce ticks of the ixodidae family into Gabon. International Journal of Veterinary Sciences and Animal Husbandry. 2026; 11(1): 109-116.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.