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36TH GENERAL CONFERENCE OF THE INTERNATIONAL SCIENTIFIC COUNCIL FOR TRYPANOSOMIASIS RESEARCH AND CONTROL (ISCTRC)

PROGRAMME AND ABSTRACTS BOOK

African Union

36TH GENERAL CONFERENCE OF THE INTERNATIONAL SCIENTIFIC COUNCIL FOR TRYPANOSOMIASIS RESEARCH AND CONTROL (ISCTRC)

PROGRAMME AND ABSTRACTS BOOK

ABOUT THE CONFERENCE

Theme of the Conference

Sustainable tsetse and trypanosomiasis control for socio-economic development

Members of the Scientific Committee

The committee received and considered 178 abstracts addressing the various themes for the conference.

Dr. Hayum Salih, Director of AU-IBAR, Chairperson

Dr. James Wabacha, ISCTRC Secretary, Member Dr. Seth Onyango, Member

Dr. Daniel Masiga, Member Dr. Jose Ramon Franco, Member

Dr. Rajinder Saini, Member

Rapporteur and Moderators

Rapporteur General: Dr Zakaria BENGALY

Deputy Rapporteur General: Prof. Enock Matovu

Moderators and rapporteurs for the various thematic sessions are as per the programme

Presentation guidelines

Allocated time for presentations:
Each presentation will be allocated 10 minutes and 5 minutes for discussion.

Viewing of posters
There will be continuous viewing of the posters. The presenters for the posters will be at the stands during the coffee/tea breaks. There will be general discussion on the posters in the plenary on Thursday, 21st September 2023.

Uploading of presentations in the conference computer

Presenters who will be making presentation during the first day are requested to upload their presentation during registration on Sunday. The rest of the

presentations will be uploaded in the conference computer on the eve of the presentation. The Rapporteurs will support you on this activity. The presenters for each session will take front seats in preparation for presentation and discussions.

Presentation by Organizations
Representatives of organizations will make their presentations on the first day of the conference during the second Session.

Certificate awards for the best posters
There will be awards of Certificates for the best five (5) posters presented at the conference. You are therefore requested to vote for one poster indicating your name and poster number.

A summary of presentations that will be made during the conference

Thematic area	**Oral**	**Poster**	**Total**
PATTEC and Country reports	22		22
Human African Trypanosomiasis	32	10	42
Animal African trypanosomiasis	28	11	39
Glossina Biology, Control and Eradication	19	29	48
Land use, environment and Socio-economics	8	5	13
Total	**109**	**55**	**164**

NATIONAL COORDINATING COMMITTEE

Dr. Seth O. Onyango	KENTEC	Chairman
Prof. David Kihurani	University of Nairobi	Member
Dr. Dominic Mijele	Kenya Wildlife Service	Member
Dr. Irene Onyango	Directorate of Veterinary Services	Member
Dr. Daniel Masiga	ICIPE	Member
Dr. William Akwimbi	State Department for Livestock Development	Member
Dr. Monicah Maichomo	KARLO	Member
Mr. Boniface Mutiso	State Department for Citizen Services	Member
Mr. Caleb Kisienya	Directorate of Livestock Development	Member
Ms. Fiona Kakai	SD for Internal Security and National Adm	Member
Mr. William Too	SD for Crops Development	Member
Mr. Dickson Kioko	Ministry of Health	Member
Mr. Cyrus Muiru	KENTEC	Secretary

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TIME	ACTIVITY	PRESENTER
	Sunday, 17th September 2023	
08.15-18.00	Registration, Distribution of documents and display of posters	
	Monday, 18th September 2023	
	Master of Ceremony - Dr. Mary Mbole-Kariuki	
08.00-0.900	Registration, Distribution of documents and display of posters	
	SESSION 1	
09.00	**OPENING CEREMONY** Statements by officials	
	Keynote Address: Sustainable tsetse and trypanosomiasis control for socio-economic development - H.E Josefa Leonel Correia Sacko, *Commissioner for Agriculture Rural Development Blue Economy and Sustainable Environment (ARBE)*	H.E Josefa Leonel Correia Sacko
11.10 - 11.30	***Health Break and Viewing of Posters***	
	SESSION 2	
	Presentations by International Organizations	
	Moderator: Dr. Huyam Salih **Rapporteur:** Giuliano Cecchi	
11.30 -13.00	Presentations by Representatives of Organizations (FAO/PAAT, WHO, WOAH, IAEA, ILRI, ICIPE, CIRDES, FIND, DNDi, GALMed)	
13.00- 14.00	***Lunch break***	

TIME	ACTIVITY	PRESENTER
	SESSION 3	
Theme 1: PATTEC initiative and Country reports		
	Moderator: Dr. Yahaya ADAM **Rapporteur:** Dr. Percoma Lassane	
14.00-14.20	**Key Note presentation** Mobilizing action to accelerate implementation of the PATTEC Initiative	John Kabayo
14.20-14.30	Discussion	
	SESSION 3a: Country Reports	
14.30 - 14.40	1.01 Tsetse and trypanosomiasis control in Kenya during the years 2020 to 2023 (**183**)	Seth O. Onyango
14.40 - 14.50	1.02 Country report on tsetse and trypanosomiasis control in Uganda (**182**)	Lawrence Tusimomuhangi
14.50 - 15.00	1.03 Pan-African Campaign for the Eradication of Tsetse Fly and Trypanosomiasis (PATTEC) (2019-2023) (**180**)	Boma Soudah
15.00 - 15.10	1.04 Ghana report on progress made since 2020 (**178**)	Yahaya ADAM
15.10 - 15.20	1.05 Country report on PATTEC-Nigeria control Interventions/activities from 2020 – 2022 (**181**)	J. J. Ajakaiye
15.20 - 15.30	1.06 Zambia: country report for the period 2019 to 2023 (**176**) Chilongo K. and Muyobela J.	Chilongo K
15.30 - 15.40	1.07 Country Report for Zimbabwe for the Period 2021-2022 (**23**) A. Mhindurwa	A. Mhindurwa
15.40 - 15.50	1.08 Tsetse fly and trypanosomosis control activities in Burkina Faso within the framework of the PATTEC initiative (**48**)	Soumaïla PAGABELEGUEM
15.50 - 16.20	Discussions	
16.20 - 16.45	***Health Break and Viewing of Posters***	

TIME	ACTIVITY	PRESENTER
	SESSION 3b:	
16.45 - 16.55	1.09 Tsetse fly and trypanosomosis control in Senegal (**67**) *Adji Marème Gaye, Assane Guèye Fall1, Momar Talla Seck, Mamadou Ciss, Mame Thierno Bakhoum1, Baba Sall, Geoffrey Gimonneau1, Mireille Djimangali Bassène, Marc J.B. Vreysen, Jérémy Bouyer*	Adji Marème Gaye
16.55 - 17.05	1.10 Mali Country Report on Progress Made since Septembre 2019 (**141**)	Dr Modibo DIARRA
17.05 - 17.15	1.11 Situational Analysis of Tsetse and Trypanosomiasis in South Sudan: A country Report (**108**)	Erneo B. Ochi
17.15 - 17.25	1.12 Tsetse flies and Trypanosomiasis in Tanzania: Current Status and Control Approaches (**185**) *Benezeth Lutege Malinda, Christopher Sikombe, Vayan Levanoi, Oliva Manangwa, and Hezron Nonga*	Benezeth Lutege Malinda
17.25 - 17.35	1.13 Status of tsetse and trypanosomosis control in Malawi (**86**)	Innocent Nkangala (Online)
17.35 - 17.45	1.14 National report on progress in Cameroon (**184**) Abah Samuel, Achiri Fru Martin, Nabilah Mpemi, Nyat Chevallier	Abah Samuel
17.45 – 18:15	Discussion	
	Tuesday 19th September 2023	
	SESSION 3c:	
Theme 1: PATTEC initiative and Country reports Continued		
08.15 - 08.25	1.15 Assessment of Tsetse fly prevalence in Central African Republic livestock areas (**101**) *E. Nguertoum; J.C. Kounda Gboumbi*	E. Nguertoum
08.25- 08.35	1.16 Report activities to human African trypanosomiasis control in Guinea (**179**)	
08.35 - 08.45	1.17 Eswatini T&T Surveillance activities 2021 (**125**)	Zanele Milly Vilakati

TIME	ACTIVITY	PRESENTER
08.45- 08.55	1.18 Current situation of Human African Trypanosomiasis (HAT) in Tanzania (**50**) *Togolai Mbilu, Gwakisa John, Jubilate Bernard, Alice Kalulu, and Lucas Matemba*	Togolai Mbilu
08.55-09.05	1.19 Elimination of Human African Trypanosomiasis in Cameroon: challenges and lessons learnt (**70**) *A. Acho1, S. Mefoug, S. Emtom, T. Tonye, GA. Etoundi*	A. Acho1
09.05 - 09.15	1.20 The Challenges Facing the National HAT Control Programme in Equatorial Guinea (**111**) *Pedro Ndongo Asumu; Eustaquio Nguema Ndong Akeng*	Dr Pedro Ndongo Asumu
09.15 - 09.25	1.21 Uganda Eliminates Gambiense Human African Trypanosomiasis (g-HAT) as a Public Health Problem (**166**)	Charles W. Wamboga
09.25-09-35	1.22 Conducting HAT active screening with rapid diagnostic tests: the Guinean experience (2016-2021) (**185**) *Oumou Camara, Windingoudi Justin Kaboré, Aïssata Soumah, Mamadou Leno, Mo-hamed Sam Bangoura, Dominique N'Diaye, Sylvain Biéler, Mamadou Camara, Jean-Mathieu Bart, Brice Rotureau, Bruno Bucheton*	Oumou Camara
09.35 - 10.05	Discussion	
10.05 - 10.30	***Health Break and Viewing of Posters***	
SESSION 4		
Theme 2: Human African Trypanosomiasis (HAT)		
	Moderator: Dr. Florent MBO Kuikumbi **Rapporteur:** Dr. Charles Wamboga	
10.30 - 10.50	**Key note Presentation** Towards elimination of human African trypanosomiasis by 2030. Challenges and opportunities.	Jose Ramon
10.50 - 11.00	Discussions	

TIME	ACTIVITY	PRESENTER
	SESSION 4a: HAT Diagnosis	
11.00 - 11.10	2.01 A Nanobody-Antibody Hybrid Sandwich Technology offers alternative approach to Immunodiagnosis of Trypanosomiasis (**17**) *Steven Odongo, Magdalena Radwanska, Stefan Magez*	Steven Odongo
11.10- 11.20	2.02 Specificity of serological screening tests for diagnosis of gambiense human African trypanosomiasis in Côte d'Ivoire and Guinea (**54**) *N'Djetchi MK, Camara O, Koffi M, Camara M, Kaba D, Kaboré J, Camara A, Rotureau B,Glover L, Solano P, Mélika T, Koné M, Coulibaly B, Adingra G, Soumah A, Gassama MD, Camara AD, Compaore C, Camara A, Boiro S, Perez Anton E, Bessell P,Van Reet N, Bucheton B, Jamonneau V, Bart JM, Biéler S, Lejon V*	Lejon V
11.20 - 11.30	2.03 Conducting HAT active screening with rapid diagnostic tests: the Guinean experience (2016-2021) (**154**) *Oumou Camara, Windingoudi Justin Kaboré, Aïssata Soumah, Mamadou Leno, Mohamed Sam Bangoura, Dominique N'Diaye, Sylvain Biéler, Mamadou Camara, Jean-Mathieu Bart, Brice Rotureau, Bruno Bucheton*	Oumou Camara
11.30- 11.40	2.04 Phase I evaluation of the Abbott Bioline HAT 2.0, a rapid diagnostic test for Human African Trypanosomiasis based on recombinant antigens (**115**) *Sara Tablado Alonso, Sylvain Biéler, Raquel Inocêncio Da Luz, Paul Verlé, Philippe Büscher, Epco Hasker*	Sara Tablado Alonso
11.40 - 11.50	2.05 Assessment of recombinant HAT-RDT specificity (**116**) *Sara Tablado Alonso, Raquel Inocêncio da Luz, Paul Verlé, Philippe Büscher, Dieudonné Mumba Ngoyi, Erick Mwamba Miaka, Epco Hasker*	Sara Tablado Alonso
11.50 - 12.00	2.06 Innovating Passive Screening for sleeping sickness: Assessing Post Hoc Confirmation Tests in a DRC Pilot Study (**158**) *Lucas Verstraeten*	Lucas Verstraeten

TIME	ACTIVITY	PRESENTER
12.00 - 12.10	2.07 Immunotrypanolysis, the key for HAT elimination by 2030 in Democratic Republic of the Congo (**73**) *Lutandila B, Mavanga E, Ngay L, Mbaya K, Kabongo T, Bonana I, Mbambi N, Pyana PP*	Pyana PP
12.10 - 12.20	2.08 Lighting the path to elimination: fluorescent immune trypanolysis for gHAT serodiagnosis (**138**) *Nick Van Reet, Niki Danel, Jan Van Den Abbeele, Philippe Büscher & Stijn Rogé*	Nick Van Reet,
12.20 – 13.00	Discussions	
13.00 - 14.00	***Lunch break***	
Theme 2: Human African Trypanosomiasis		
SESSION 4b: HAT Screening strategies and elimination		
14.00 - 14.10	2.09 Active search strategy for human African trypanosomiasis cases (HAT) in villages without new cases for 10 years by a health district team **(98)** *Nkieri Matthieu, Mukuba Mvembuli, Nganzobo Pathou, Basake Kalema, Mutuy Bena, Mwamba Eric, Philippe Donen, Aline Labat, Mitashi Patrick, Mbo Florent*	Nkieri Matthieu
14.10 - 14.20	2.10 Human African Trypanosomiasis challenge and perspective of unconfirmed serological **(113)** *Rashidi Assani Samuel, Julienne Tshowa, Florent Mbo, Alain Panya, Erick Miaka*	Rashidi Assani Samuel
14.20 – 14.30	2.11 Active search for unconfirmed HAT serologically positive individuals with trypanolysis test from 2019 to 2022 in the Democratic Republic of Congo **(169)** *Albert Nyembo, Digas Ngolo, Olaf Valverde, Alphonsine Bilonda, Jose Dinanga, Pati Pyana, Alain Fukinsia, Pathou Nganzobo, Julienne Tshowa, Christian Miaka, Erick Mwamba, Florent Mbo*	Albert Nyembo
14.30 - 14.40	2.12 The effectiveness of Innovative Screening Methods in eliminating Human African Trypanosomiasis: Pilot project (TrypElim) conducted in two health districts of the Democratic Republic of Congo **(156)**	Nganzobo Pathou

TIME	ACTIVITY	PRESENTER
14.40- 14.50	2.13 Spatial monitoring: a targeted and integrated approach to accelerate the process of eliminating HAT in the Republic of Guinea **(140)** *Kagbadouno M-S, Bart J-M, Bessel P, Camara A-D, Camara O, Camara I-D, Camara M, Diallo M-B, Courtin F, Solano P, Camara M, Bucheton B*	Kagbadouno M-S
14.50- 15.00	2.14 HAT in the DRC : can mathematical modelling explain increasing case reporting in Grand-Kasaï from 2018 to 2022? **(114)** *Shampa CHANSY, Ron E CRUMP, Julienne TSHOWA, Christian M. ILENGE, José DIMANDJA, Ching-I HUANG, E M MIAKA, Kat S ROCK*	Shampa CHANSY
15.00-15.10	2.15 A costing and cost-effectiveness analysis of surveillance strategies for a sustainable elimination of human African trypanosomiasis in Côte d'Ivoire **(128)** *Minayégninrin Koné, Samuel A. Sutherland, Guy Pacome Adingra, Bamoro Coulibaly, Ron E. Crump, Ida Brou Assié, Mathurin Koffi, Dramane Kaba, Lingué Kouakou, N'gouan Kouassi Emmanuel, Vincent Djohan, Paul Bessell, Antoine Barreaux, Ching-I Huang, Christopher Davis, Jason Madan, Vincent Jamonneau, Kat S. Rock*	Minayégninrin Koné
15.10- 15.20	2.16 Cost-effectiveness analysis of targeted end-game interventions against gambiense human African trypanosomiasis in the Democratic Republic of Congo **(136)** *Marina Antillon, Ching-I Huang, Sam Sutherland, Ron E Crump, Paul E Brown, Paul Bessell, Emily H Crowley, Rian Snijders, Andrew Hope, Iñaki Tirados, Chansy Shampa, Junior Lebuki, Erick Mwamba Miaka, Fabrizio Tediosi, Kat S Rock*	Kat S Rock
15.20-15.30	2.17 Factors associated with active HAT screening at the Bikoro rural health zone in DRC. **(51)** *Guylain Mandula*	Guylain Mandula

TIME	ACTIVITY	PRESENTER
15.30-15.40	2.18 Barriers to the integration of HAT early case detection activities into primary health care services in Bibanga, (DR Congo) **(55)** *Jérémie Ilunga, Philippe Mulenga, Julienne Tshowa, Daniel Ishoso, Gilbert Wembodinga*	Jérémie Ilunga
15.40-15.50	2.19 Whose Elimination? Frontline Workers' Perspectives on the Elimination of the Human African Trypanosomiasis and Its Anticipated Consequences **(164)** *Jean-Benoît Falisse, Erick Mwamba-Miaka , Alain Mpany*	Jean-Benoît Falisse
15.50-16.00	2.20 Strengthening impact of passive prospecting combined with directed reactive prospecting for the elimination of sleeping sickness in Angola. **(186)** MAKANA Don Paul, Mbueno, KAYEMBE Simon, BESSELL Paul, Peliganga, Constantina MACHADO, NDUNG'U Joseph	MAKANA Don Paul
16.00-16.30	Discussion	
16.30 – 17.00	***Health Break and Viewing of Posters***	
Wednesday 20th September 2023		
SESSION 4c: HAT treatment and vaccines		
08.15- 08.25	2.21 Repurposing the Medicines for Malaria Venture (MMV) COVID Box library identified the anticancer drug Delanzomib as a fast-acting antitrypanosomal agent**.(147)** *Claire Vianey Tchuenguia, Darline Dize, Germaine Yanou Bougnogolo, Tchokouaha Yamthe LR, Tsouh Fokou PV, Benoît Laleu, James Duffy, Fabrice Fekam Boyom*	Fabrice Fekam Boyom
08.25- 08.35	2.22 Novel antitrypanosomal diaminoquinazoline analogues from repurposing the Medicines for Malaria Venture Open Access Pathogen Box library (MMVPBox) **(165)** *Darline Dize, Rolland B. Tata, Rodrigue Keumoe, Rufin M. K. Toghueo, Mariscal B. Tchatat, Cyrille N. Njanpa, Vianey C. Tchuenguia, Lauve T. Yamthe, Patrick V.T. Fokou, Benoît Laleu, James Duffy, Ozlem T. Bishop, Fabrice Fekam Boyom*	Darline Dize

TIME	ACTIVITY	PRESENTER
08.35 - 08.45	2.23 Novel treatment for Human African Trypanosomiasis in Guinea: Feasibility study in three sleeping sickness foci (Dubréka, Forécariah, Boffa). **(10)** *Camara Mariame Layba*	Camara Mariame Layba
08.45 - 08.55	2.24 Access to Fexinidazole, a new oral drug against T.b gambiense HAT in the context of the COVID-19 pandemic in the DRC: January 2020 to December 2021**(60)** *Digas Ngolo, Florent Mbo, Wilfried Mutombo, Alphonsine Bilonda, Albert Nyembo, Alain Fukinsia, Pathou Nganzobo, Julienne Tshowa, Samuel Rachidi, Papy Kavunga, Junior Munganga, Erick Miaka, Antoine Tarral, Olaf Valverde.*	Digas Ngolo
08.55 - 09.05	2.25 Perspectives for the introduction of fexinidazole to treat r-HAT: HAT-r-ACC project results**.(155)** *Olaf Valverde Mordt; Deolinda Alves, Christelle Perdrieu, Marshal Lemerani, Westain Tizgo Nyirenda, Anthony Eriatu, Charles Wamboga, Jorge Seixas , Veerle Lejon , Aita Signorell, Elisabeth Baudin, Enock Matovu*	Enock Matovu
09.05 - 09.15	2.26 Efficacy and safety of acoziborole in patients with human African trypanosomiasis caused by Trypanosoma brucei gambiense: a multicentre, open-label, single-arm, phase 2/3 trial **(146)** *Victor Kande Betu Kumeso, Wilfried Mutombo Kalonji, Sandra Rembry, Olaf Valverde Mordt, Digas Ngolo Tete, Adeline Prêtre, Mamadou Camara, Julie Catusse, Stefan Schneitter, Morgane Nusbaumer, Erick Mwamba Miaka, Bruno Scherrer, Nathalie Strub-Wourgaft, Antoine Tarral*	Ngolo Tete
09.15 - 09.25	2.27 DNA Vaccine encoding Trypanosoma brucei Major Surface Protease-B induced IgG response and conferred partial protection in Immunized BALB/c mice **(92)** *Yusuf, A. B, Flore, G. E, Habila, A. J, Kogi, C. A, Umar, I. A, Ibrahim, S, Kabir, J, Kenji, H, Kentaro, K, Velasquez, C.V., Inaoka, D. K., Mamman, M., Balogun, E. O and Shuaibu, M. N,*	Yusuf, A. B
09.25-10.00	Discussion	
10.00 - 10.30	***Health Break and Viewing of Posters***	

TIME	ACTIVITY	PRESENTER
SESSION 4d: HAT animal reservoir and vector control in HAT elimination		
10.30-10.40	2.28 Tracking the animal reservoir of T.b. gambiense: reactive veterinary screening in Mayili **(137)** *Nick Van Reet, Stijn Rogé, Raquel Inocêncio Da Luz, Jan Van Den Abbeele, Philippe Büscher, Caroline Aurore Seghers, Dieudonne Mumba Ngoyi, Oliver Fataki, Bobo Lutandila, Enock Mavanga & Pati Patient Pyana, Jeannette Bawota, Erick Mwamba Miaka*	Nick Van Reet
10.40-10.50	2.29 Study of animal reservoir of Trypanosoma brucei gambiense for a sustainable elimination of human african trypanosomiasis in Côte d'ivoire **(143)** *Traore B.M., N'djetchi K.M, Ahouti B, Konan T, N'dri , Kaba D., N'gouan E.K, Ble s., Kouakou, Jamonneau V. Koffi N.M.*	Traoré Barkissa Mélika.
10.50 - 11.00	2.30 Human Africa Trypanosomiasis in Littoral Region of Cameroon : an Updated With First Evidence on the Circulation of *Trypanosoma brucei gambiense* in Manoka Island **(157)** *Grace Florentine Mamia, Bita Gael Atangana, Sartrien Tagueu Kante, Romeo Martial Tchoffo-Fobasso, Arnol Auvaker Zebaze Tiofack, Herman Parfait Awono-Ambene, Gustave Simo, Jean Arthur Mbida Mbida1*	Jean Arthur Mbida Mbida1
11.00 - 11.10	2.31 The role of vector control in the elimination of human african trypanosomiasis in Côte d'ivoire (**135)** *D. Kaba, D. Berté, BTD Ta, L. Kouakou, B. Coulibaly, EK. N'gouan, M. Koffi, KAM Kouadio, M. Kassi, B. Ahouty, KD. Coulibaly, NS. Egnankon, YJR. Konan1, GP. Adingra, F. Courtin, V. Jamonneau, V. Djohan, P. Solano*	D. Kaba

TIME	ACTIVITY	PRESENTER
11.10 - 11.20	2.32 Impact of two years of vector control on trypanosome transmission in animals from the Campo HAT focus in Cameroon **(145)** *Eugenie Melaine Kemta Magang, Jenny Telleria, Rolin Mitterran Ndefo Kamga, Tito Tresor Melachio Tanekou, Severin Mefoug, Victor Kuete, Gustave Simo, Jean-Mathieu Bart,*	Jean-Mathieu Bart
11.20-11.45	Discussion	
SESSION 5		
Theme 3: Animal African Trypanosomiasis		
	Moderator: Dr. Daniel Masiga **Rapporteur:** Dr KABA Dramane	
11.45 - 12.05	**Key Note Presentation** Research and innovation in the control of African trypanosomoses in West and Central Africa: contribution of CIRDES	Dr Zakaria BENGALY
12.05- 12.15	Discussion	
SESSION 5a: Epidemiology		
12.15 - 12.25	3.01 Prevalence and risk factors for trypanosome infection in cattle from communities surrounding the Murchison Falls National Park, Uganda **(2)** Simon Peter Musinguzi, Daniel Kizza, Charles Waiswa	Simon Peter Musinguzi
12.25 - 12.35	3.02 Prevalence of Bovine Trypanosomosis, Apparent Vector Density and Associated Risk Factors in Dembecha and Debre-Elias Districts of Amhara Region, Ethiopia**. (14)** Sisay Alemu Mamo	Sisay Alemu Mamo
12.35 - 12.45	3.03 An atlas to support the progressive control of tsetse-transmitted animal trypanosomosis in Ghana **(18)** *Benita Anderson, Yahaya Adam, Charles Mahama, Yakubu Sakara, Enoch Sottie, Weining Zhao, Massimo Paone, Giuliano Cecchi*	Benita Anderson

TIME	ACTIVITY	PRESENTER
12.45-13.00	Discussion	
13.00-14.00	**Lunch Break**	
	SESSION 5b: Epidemiology	
14.00 - 14.10	3.04 Prevalence of bovine trypanosomosis, apparent density of tsetse flies and farmer's perceptions on the impact of control program in Kellem Wollega zone, western Oromia, Ethiopia **(19)** *Bedaso Kebede, Dereje Tsegaye*	Bedaso Kebede
14.10 - 14.20	3.05 Prevalence of bovine trypanosomosis and apparent density of tsetse flies in Sayonole district of western Oromia, Ethiopia **(20)** *Bedaso Kebede*	Bedaso Kebede
14.20 - 14.30	3.06 An Atlas of Surra in Spain: preliminary results **(24)** *Adrián Melián Henríquez, Margarita González-Martín, Juan Alberto Corbera, Giuliano Cecchi, María Teresa Tejedor-Junco.*	Margarita González-Martín
14.30 - 14.40	3.07 Role of Tabanids and Stomoxys in the Epizootiology of Animal Trypanosomosis in Cameroon **(25)** *Sevidzem Silas Lendzele*	Sevidzem Silas Lendzele
14.40-14.50	3.08 Molecular epidemiological survey of pathogenic trypanosomes in naturally infected cattle in northern Côte d'Ivoire **(27)** *Jean-Yves Ekra, Edouard K. N'Goran , Leonard E.G. Mboera , Biégo Guillaume Gragnon, Koco Rita Nadège Assovié, Eliakunda Michael Mafie*	Jean-Yves Ekra
14.50 – 15.00	3.09 Mapping the Pathway for Progressive Control of Animal Trypanosomosis in Kenya **(30)** *Nancy N. Ngari, Seth O. Onyango, Cyrus W. Muiru, Weining Zhao, Massimo Paone, Giuliano Cecchi, Pamela A..Olet*	Nancy N. Ngari

TIME	ACTIVITY	PRESENTER
15.00-15.10	3.10 What sustains trypanosomiasis in the absence of its biological vectors. **(59)** *Merid N Getahun, Jackson M Muema, John Ngiela, Daniel Masiga*	Merid N Getahun
15.10-15.20	3.11 Tsetse and Animal Trypanosomiasis in Somalia: Past, Present and Future Directions **(81)** *Ahmed A. Hassan-Kadle, Abdalla M. Ibrahim, Aamir M. Osman, Rafael F.C. Vieira*	Ahmed A. Hassan-Kadle
15.20 - 15.30	3.12 What do we know about Animal Trypanosomosis (AT) in tsetse-free areas in Senegal? **(35)** *Mame Thierno Bakhoum, Mireille Djimangali Bassène, Binetou Faye, Mané Diouf, Idrissa Sarr, Abdou Samath Thiall, Momar Talla Seck, Mamadou Ciss, Assane Guèye Fall*	Mame Thierno Bakhoum
15.30-16.00	Discussion	
16.00-16.30	***Health Break and Viewing of Posters***	
	SESSION 5c: Epidemiology	
16.30 - 16.40	3.13 Evaluation of Uganda's African Animal Trypanosomiasis Burden over the past 42 years **(119)** *Karla Rascon-Garcia, Enock Matovu; Beatriz Martinez Lopez, Caterina Scoglio; Dennis Muhanguzi*	Karla Rascon-Garcia
16.40 - 16.50	3.14 An update of the continental atlas of tsetse and animal african trypanosomiasis in Nigeria. **(122)** *Musa, U. B; Okoh, K. E; Lifidi, J. K; Ogbole, M; Samuel, J. A; Jonah, A; Ajakaiye, J. J*	Samuel, J. A
16.50-17.00	3.15 Developing an atlas of tsetse flies and african animal trypanosomosis in Côte d'ivoire **(131)** *D. Berté, B. Coulibaly, KD. Coulibaly, BTD Ta, NS. Egnankon, YJR. Konan, KAM Kouadio, GP Adingra, AA. Ouattara, KL. Bamba, RE Hounyèmè, V. Kallo., A. Boulangé., M Paone, V. Jamonneau, Djohan, D. Kaba1, G. Cecchi.*	D. Berté
17.00 – 17.30	Discussion	

TIME	ACTIVITY	PRESENTER
	Thursday 21st September 2023	
	SESSION 5c Diagnosis	
08.15 – 08.25	3.16 Design and production of five chimeric multivalent proteins for the serological diagnosis of African animal trypanosomiasis (42) *Robert Eustache Hounyèmè, Loïc Rivière, Dramane Kaba, Veerle Lejon, Dominique Valtain, Antoine Abel Missihoun I, Alain Boulangé*	Alain Boulangé
08.25 - 08.35	3.17 Characterization of the evolution of basic haematological and biochemical variables in relation with bovine trypanotolerance during an experimental infection by Trypanosoma congolense **(79)** *Fabrice Gnohion Somé , Modou Séré, Bienvenu Martin Somda , Guiguigbaza-Kossigan Dayo, Hassane Sakandé , Saïdou Bolly , Moldago Ouaré , Prudencième Agboho, Jacques Kaboré, Isabelle Chantal , Sophie Thévenon, David Berthier*	Fabrice Gnohion Somé
08.35 - 08.45	3.18 Molecular and microscopy diagnoses of the Gambian cattle for three trypanosomes **(87)** *Olawale F. Olaniyan, İbrahim Kayab*	Olawale F. Olaniyan
08.45 - 08.55	3.19 A Comparative Evaluation of LAT, ELISA and SAT Tests For Diagnosis of Animals (sheep and goats) trypanosomosis in Khartoum State (99) *Youssif, M, F, Mohammed, O.S.A*	Youssif, M, F.
08.55 - 09.05	3.20 Application of SHERLOCK detection for epidemiological surveys of Animal African Trypanosomiases **(152)** Roger-Junior Eloiflin, Elena Perez Anton, Aïssata Camara, Annick Dujeancourt-Henry, Martial Kassi N'Djetchi, Mathurin Koffi, Dramane Kaba, Vincent Jamonneau, Eugénie Magang, Gustave Simo, Jean-Mathieu Bart, Lucy Glover, Brice Rotureau	Roger-Junior Eloiflin I
09.05 – 10.00	Discussion	
10.00 - 10.30	***Health Break and Viewing of Posters***	

TIME	ACTIVITY	PRESENTER
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SESSION 5d :Vaccines, chemotherapy and drug resistance		
10.30 - 10.40	3.21 Resistance to trypanocidal drugs in cattle populations of Homabay County, Kenya **(75)** *Boscoh Odhiambo K, Luis Neves, Daniel Masiga, Ilse Vorster*	Boscoh Odhiambo K
10.40 - 10.50	3.22 Ascofuranone (AF) antibiotic is a promising trypanocidal drug for nagana **(9)** *Suganuma Keisuke, Mochabo Kennedy Miyoro, Chemuliti Kusimba Judith, Kiyoshi Kita, Noboru Inoue, Shin-ichiro Kawazu*	Mochabo Kennedy Miyoro
10.50 - 11.00	3.23 Preliminary result on vaccine against trypanosome using based on nanoparticle loaded with antigen **(33)** *Nzoumbou-Boko Romaric, Cyrille Oliver Ozzin-Kholy Zolipou, Mireille Denissio Morissi, François Fasquelle, Philippe Vincendeau, Didier Betbeder*	Nzoumbou-Boko Romaric
11.00 - 11.10	3.24 In vitro trypanocidal activity of different extracts of Elaeis guineensis (Arecaceae) and Khaya senegalensis (Meliaceae) on Trypanosoma brucei brucei isolated from West-African cattle. **(75)** *Sèsséya Arnaud Sas Soha, Martin Bienvenu Somda, Victorien Tamègnon Dougnon, Zakaria Bengaly, Thierry Lefèvre, Jean Robert Klotoe, Tossou Jacques Dougnon, Abdou Karim Issaka Youssao, Souaïbou Farougou, Souleymane Diallo, Marc Kpodékon, Chia Valentine Yapi-Gnaore*	Sèsséya Arnaud Sas Soha (Online)
11.10 - 11.20	3.25 In vitro and in vivo antitrypanosomal effects of hydromethanolic extracts of solanum anguivi fruits and echinops kebericho roots **(84)** *Debela Abdeta*	Debela Abdeta

TIME	ACTIVITY	PRESENTER
11.20 - 11.30	3.26 The extracellular region of Trypanosoma congolense membrane bound acid phosphatase induces strong protection in immunized balb/c mice **(95)** *G. E. Flore, A. J. Habila, Y. A. Bashir, K. A. Cecilia, M. M. Mamman, D. Anaoka, K. Hirayama, M. N. Shuaibu, E. O. Balogun*	G. E. Flore
11.30 - 11.40	3.27 Discovery of a novel therapeutic candidate against animal trypanosomiasis **(104)** *Kayhan Ilbeigi, Dorien Mabille, An Matheeussen, Rik Hendrickx, Nick Van Reet, Birgit Mertens, Roel Anthonissen, Fabian Hulpia, Louis Maes, Clement Regnault, Phil Whitfield, Marzuq A. Ungogo, Harry P. De Koning, Serge Van Calenbergh, Guy Caljon I*	Guy Caljon
11.40 - 11.50	3.28 Quantifying reasons for treatment failure with trypanocides used on cattle **(160)** *Shauna Richards, Davide Pagnossin, Paul Buyugu, Furaha Mramba, Oliva Manangwa, Emmanuel Sindoya, Edith Paxton, Louise Matthews, Mike Barrett, Stephen Torr, Liam Morrison, Harriet Auty*	Harriet Auty

11.50-11.20	Discussion	
	SESSION 6: Poster Session	
11.20-13.00	Discussions in the conference hall **Moderator:** Dr. Alain Boulangé **Rapporteur:** Ms. Nancy N. Ngari	
13.00 - 14.00	***Lunch break***	
	SESSION 7	
	THEME 4: Glossina Biology, Control and Eradication	
	Moderator: Dr. Rajinder Saini **Rapporteur:** DR. J. J. Ajakaiye	

14.00 – 14.20	**Key Note presentation** **"**Future challenges in tsetse and trypanosomiasis control" John Hargrove, Glyn Vale, Stephen Torr et al.	John Hargrove
14.20-14.30	Discussion	
	Session 7a: Glossina Biology I	
14.30-14.40	4.01 Population genetics of Glossina fuscipes fuscipes from southern Chad **(11)** *Sophie Ravel, Mahamat Hissène Mahamat, Adeline Ségard, Rafael Argiles-Herrero, Jérémy Bouyer, Jean-Baptiste Rayaisse, Philippe Solano, Brahim Guihini Mollo, Mallaye Pèka, Justin Darnas, Adrien Marie Gaston Belem, Wilfrid Yoni, Thierry de Meeûs*	Thierry de Meeûs
14.40-14.50	4.02 Putative vertebrate host preferences of Glossina austeni and Glossina pallidipes tsetse flies in Kilifi and Kwale counties, Kenya **(21)** Kennedy O. Ogolla, Tevin Onyango, Billiah K. Bwana, Moses Y. Otiende, Clarence M. Mang'era, Benard Ochieng, Maurice O. Omolo, John M. Mugambi, Ahmed Hassanali, Patrick Omondi, Paul O. Mireji1	Kennedy O. Ogolla
14.50-15.00	4.03 Automated tsetse pupae sex sorting by utilising near-infrared imaging **(31)** *Chantel J. de Beer, Rafael Argilés-Herrero, Olga Soukia, Anibal Morales-Zambrana, Marc J.B. Vreysen*	Chantel J. de Beer
15.00 - 15.10	4.04 Gamma-radiation of Glossina palpalis gambiensis revisited: effect on fertility and mating competitiveness **(49)** Soumaïla Pagabeleguem, Oumar Koughuindida, Ernest Wendemanegde Salou, Geoffrey Gimonneau, Ange Irénée Toé, Bénéwendé Aristide Kaboré, Kiswend-sida Mikhailou Dera, Hamidou Maïga, Adrien Marie Gaston Belem, Gisèle Marie Sophie Sanou/Ouédraogo, Marc JB Vreysen, Jeremy Bouyer	Soumaïla Pagabeleguem,

TIME	ACTIVITY	PRESENTER
15.10 - 15.20	4.05 Finding sources of re-infestation: Spatial scale of genetic connectivity of tsetse populations along the Ugandan and Kenyan shore of Lake Victoria **(56)** *Bateta Rosemary*	Bateta Rosemary
15.20 - 16.00	Discussions	
16.00 - 16.30	***Health Break and viewing of Posters***	
	SESSION 7b: Glossina biology II	
16.30 - 16.40	4.06 Population structure and genetic diversity of Glossina of the palpalis group from Congo: the challenges for control strategies **(102)** *Abraham Mayoke, Johnson O. Ouma , Paul O. Mireji,Stephen F. Omondi, Shadrack M. Muya,Andre Itoua, Sylvance O. Okoth , Rosemary Bateta*	Abraham Mayoke
16.40 - 16.50	4.07 Tsetse transmitted trypanosomes: from the skin to a systemic infection **(103)** *Dorien Mabille, Kayhan Ilbeigi, Mathieu Claes, Carl De Trez, Benoît Stijlemans, David Pérez-Morga, Guy Caljon*	Guy Caljon
16.50 - 17.00	4.08 Effects of Oxytetracycline and Penicillin/Streptomycin on the survival and pupae production in Glossina palpalis gambiensis (Diptera: Glossinidae) **(105)** *Soudah BOMA, Prudenciène Agboho, Sié Hermann POODA, Kassamba Korotimi, Ernest Wendemanegde SALOU, Guiguigbaza-Kossigan Dayo*	Soudah BOMA (Online)
17.00 - 17.10	4.09 Phylogenetic relationship and diversity of Glossina of the palpalis group from Congo: the challenges for control strategies **(107)** *Abraham Mayoke, Shadrack M. Muya , Rosemary Bateta, Paul O. Mireji, Sylvance O. Okoth, Samuel G. Onyoyo, Joanna E. Auma, Johnson O. Ouma*	Abraham Mayoke

TIME	ACTIVITY	PRESENTER
17.10 - 17.20	4.10 Identification of Cameroonian tsetse fly species based on morphological characters and nuclear Internal transcribed spacer 1 sequence polymorphism: Importance in planning efficient vector control **(163)** *Feudjio Soffack Steve*	Feudjio Soffack Steve
17.20-17.50	Discussion	

	Friday 22nd September 2023	
	SESSION 7c: Control and eradication	
08.15- 08.25	4.11 A continental atlas of tsetse fly distribution for Africa **(187)** *Giuliano Cecchi, Massimo Paone, Jill de Gier, Raffaele Mattioli, Weining Zhao*	Giuliano Cecchi
08.25- 08.35	4.12 Novel tsetse fly repellent for control of savannah tsetse fly in East Africa **(8)** *Paul O Mireji, Richard Echodu, Imna Malele, Daniel Ochieng Gamba, Johnson Ouma, Michael Okal, Benson Wachira, Margaret Ng'ang'a, Eric Masika, Bernadatte Moraa, Ahmed Hassanali*	Paul O Mireji
08.35- 08.45	4.13 Elimination of Glossina palpalis gambiensis from the Niayes area of Senegal, a dream that became true: impact on the epidemiology of African animal trypanosomosis **(68)** *Assane Guèye Fall1, Adji Marème Gaye, Momar Talla Seck, Mamadou Ciss, Mame Thierno Bakhoum, Baba Sall, Geoffrey Gimonneau, Mireille Djimangali Bassène, Renaud Lancelot, Marc J.B. Vreysen, Jérémy Bouyer*	Assane Guèye Fall (Online)
08.45- 08.55	4.14 Mapping the progressive control pathway for African animal trypanosomosis in Burkina Faso **(71)** *L. Percoma, S. Pagabeleguem, S. Boma, A. Prudenciène, M. Paone, G. Cecchi*	L. Percoma

TIME	ACTIVITY	PRESENTER
08.55- 09.05	4.15 Parasitological and entomological large-scale field survey on the Adamaoua Plateau in Cameroon: 20 years after a titaness aerial spraying tsetse eradication campaign **(91)** *N. Mbahin; B. Fatimatou, S. Abba*	N. Mbahin
09.05- 09.15	4.16 Integration of Tsetse Fly and Trypanosomiasis Control Methods from Livestock Farmers' Perspective: A Multivariate Probit Approach **(129)** *Seth Ooko Onyango, Sabina Mukoya-Wangia, Josiah Mwivandi Kinama, Pamela Akinyi Olet*	Seth Ooko Onyango
09.15- 09.25	4.17 The 'Gréouno Model' cross-screens, an improvement adapted to the Guinean mangrove area for Glossina palpalpalis gambiensis vector control **(139)** *Kagbadouno M, Camara AD, Bart JM, Solano P, Bucheton B, Camara M, Grébaut P.*	Kagbadouno M
09.25- 09.35	4.18 Tackling tsetse: spatial-temporal insights for timely and targeted control **(151)** *Stella Gachoki*	Stella Gachoki
09.35- 09.45	4.19 Trypanosome induced metabolites as potent attractants for Glossina pallidipes**. (175)** *Rungua Chiro Rungua, Merid Getahun Negash, Jenard Patrick Mbugi, Lucy Kamau*	Rungua Chiro Rungua
09.45- 09.55	4.20 Sex bias of Glossina morsitans caught in baited ng2g traps in Kidepo Valley Natonal Park, Uganda **(186)** JM Kiragu, M. Mutinda, RD Ntegeka	JM Kiragu
09.55- 10.30	Discussions	
10.30- 11.00	***Health Break***	

TIME	ACTIVITY	PRESENTER
	Friday 22nd September 2023	
	SESSION 8	
	Theme: 5 Land Use Environment and Socio - economics	
	Moderator: Deusdedit Malulu **Rapporteur:** Dr. Mame Thierno BAKHOUM	
11.00 - 11.20	**Key Note Presentation** "Community engagement and involvement in T&T control: opportunities and challenges"	Salome Bukachi & Julia Karuga
11.20 - 11.30	Discussion	
	SESSION 8a: Community Participation	
11.30 - 11.40	5.01 Sustainability of insecticide treated cattle (itc) strategy as an income generating activity (iga) for community based organizations in tsetse and trypanosomiasis control: a Case Study of Osiligi Lo Laramatak and Enduata Ngenjuk Community Groups – Narok county (**46**) *Sylvia Muthama Korir, Ngari Nancy, Isaiah Ndaburu Kiteto, Wangui Kinyanjui, Dr. Seth Onyango*	Sylvia Muthama Korir1
11.40 - 11.50	5.02 A review of women participation in community tsetse and trypanosomiasis control in western region of Kenya **(47)** *Agnes I. Otwani, Seth Onyango, Dickson Bandika*	Agnes I. Otwani
11.50 - 12.00	5.03 Knowledge, attitude and practices on tsetse control among communities in Kilifi County, Kenya **(52)** *Caren Kikwai, Moses Ngeiywa, Seth Onyango, Nancy Ngari, Johana Cheptoo.*	Caren Kikwai
	SESSION 8b: Socio-economics	
12.00 - 12.10	5.04 The economic cost of bovine trypanosomosis in pastoral and ago pastoral communities surrounding Murchision Falls National park, Buliisa district, Uganda **(7)** *Daniel Kizza, Michael Ocaido, Rose Azuba, Howard Onyuth, Simon Peter Musinguzi, Charles Waiswa*	Daniel Kizza

TIME	ACTIVITY	PRESENTER
12.10 - 12.20	5.05 Market survey and consumer preference for Novel Tsetse fly Repellent in Tanzania **(62)** *Deusdedit Malulu, Imna Malele, Johnson Ouma, Paul Mireji*	Deusdedit Malulu
12.20 - 12.30	5.06 African trypanosomiasis control methods vs financial net return **(82)** *Gloria M. Mulenga , Kalinga Chilongo, Chrisborn Mubamba , and Bruce Gummow*	Gloria M. Mulenga
12.30 - 12.40	5.07 A Geospatial Modeling Approach to Predict the Spatial Distribution of Tsetse Fly (Glossina spp.) Habitats in Kenya **(120)** *Raphael Mongare, Stella Gachoki, Elhadi Adam, Harriet Wangu, Emily Kimathi, Henri E. Z. Tonnang1, Daniel Masiga, Elfatih M. Abdel-Rahman.*	Raphael Mongare
12.40 -13.00	Discussions	

SESSION 9		
	CLOSING CEREMONY	
	Moderator: Chairman, ISCTRC, Prof. Ndung'u **Rapporteurs:** Dr Zakaria BENGALY & Prof. Enock Matovu	
13.00 -14.00	Recommendations and closing ceremony	Director of AU-IBAR Principal Secretary State Department of Livestock Kenya
14.00 - 15.00	**Lunch**	

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PATTEC INITIATIVE AND COUNTRY REPORTS

1.01

TSETSE AND TRYPANOSOMIASIS CONTROL IN KENYA DURING THE YEARS 2020 TO 2023

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Abstract

Kenya has a long history of tsetse infestation and with it a heavy economic loss. African Animal Trypanosomosis (AAT)/Nagana transmitted by tsetse flies is endemic in the Country and Human African Trypanosomiasis (HAT)/sleeping sickness caused by Trypanosoma brucei rhodesiense was present in the past in the Western part of Kenya until the year 2009 when the last case was reported. To control tsetse flies and trypanosomiasis, a total of 3,486,433 cattle were treated with insecticide, 13,420 insecticide treated targets deployed, 2,317 tiny targets deployed and 342 zero grazing units were installed with LPF in the intervention areas from the year 2020 to date. Tsetse flies monitoring in those areas resulted in average of flies trapped per trap per day (FTD) of 4.54 for G. pallidipes, 0.21 for G. longipennis, 0.68 for G. austeni, 0.86 for G. brevipalpis, 0.87 for G. fuscipes and 2.14 for G. swynnertonni. The AAT monitoring resulted in average prevalences of 1.567% for T. vivax, 1.428% for T. congolense and 0.2096% for T. brucei from 16,496 animals screened. The HAT surveillances were carried out within the reporting period where no positive case was reported. In the implementation of European Union (EU) funded project Controlling and progressively Minimizing the Burden of African Trypanosomosis (COMBAT), Kenya has adopted the Progressive Control Pathway (PCP) in staging the progress of AAT reduction which informs the stages at which Counties are in. Out of the 47 Counties in Kenya, 25 have been categorized in Stage 1 Early, 7 Counties in Stage 1 Advanced, 10 Counties in Stage 2 Early and 5 Counties in Stage 2 Advanced. The vastness of tsetse infested areas with difficult terrains and transboundary nature of tsetse and trypanosomiasis (T&T) are some of the challenges faced. Advancing collaborations with Stakeholders at the National, Regional and International level in the implementation of tsetse and trypanosomiasis (T&T) control activities is crucial to the sustainability of the achievements made so far.

1.02

COUNTRY REPORT ON TSETSE AND TRYPANOSOMIASIS CONTROL IN UGANDA

Lawrence Tusimomuhangi

1. INTRODUCTION:

Tsetse-transmitted African Trypanosomiasis (AT) in man and domestic animals poses a serious threat to the lives and livelihoods of entire communities and constitutes the greatest single constraint to livestock production.

Trypanosomiasis problem is thus a vast and complex challenge in Sub-Saharan Africa as it manifests as human and animal disease, negatively impacting on agricultural development land use. It is also responsible for uncoordinated use of natural resources, limiting human settlements and socio-economic development.

Uganda is one of the 38 tsetse-infested countries in Sub-Saharan Africa with an estimated that 60-70% of the of the country is infested with eleven species of tsetse flies. Both Human African Trypanosomiasis (sleeping sickness) and African Animal Trypanosomiasis (nagana) are common in the tsetse- infested areas of the country. At the National level the socio-economic losses caused by the tsetse transmitted Trypanosomiasis is estimated to be USD 73 million annually.

Uganda government as a member of African Union expressed need to solve the trypanosomiasis challenge through the Pan African Tsetse and Trypanosomiasis Eradication campaign (PATTEC).

1.03

PAN-AFRICAN CAMPAIGN FOR THE ERADICATION OF TSETSE FLY AND TRYPANOSOMIASIS (PATTEC) (2019-2023)

Boma Soudah

1.04

GHANA REPORT ON PROGRESS MADE SINCE 2020

Abstract:

African Animal Trypanosomosis (AAT), constitute a major constraint on livestock production systems and general agricultural development in Ghana. The Tsetse Control Unit (TCU) is a specialised unit under the Veterinary Services Directorate of the Ministry of Food and Agriculture with the mandate: To controlling tsetse and trypanosomosis across the Country and to implementing the AU-PATTEC initiative of cross border collaboration between neighbouring tsetse infested African Countries. The objective of the Unit is to reducing the burden of trypanosomosis related problems in both human and livestock production systems across the Country. To improving food security and living standards of the rural poor by the progressive control of tsetse-transmitted trypanosomosis in Ghana. Tsetse suppression to reducing the burden of African Animal Trypanosomosis have been on going in five (5), out of the sixteen (16) Regions of Ghana, albeit on limited scales in each of the regions. The Upper West Reion (UWR) is the only Region in Ghana with a recorded tsetse suppression rate of 98% (Adam Y., et., al. 202013) and has since been under protection from surrounding regions with re-invasion pressures. Currently, the Government of Ghana is the main source of funding for the on-going intervention efforts. There are however a number of collaborative international development partners engaged in human resource capacity development for personnel of the tsetse and trypanosomosis control efforts in Ghana, such as the IAEA, FAO, APHA-UK, RAHC-ECOWAS and AU-IBAR/PATTEC. It is worth mentioning that tsetse and trypanosomosis control interventions in Northern Ghana saw a rather ironic boost from 2020 in the phase of the COVID-19 Global pandemic. The increased budgetary support for tsetse control activities was a direct response from the government to issues raised in the African Union-PATTEC sensitization Mission report of a two-man delegation to Ghana in the previous year (2019). A supplementary budgetary support had since been extended to the tsetse control Unit from the Governments flagship programme dabbed, "Rearing for Food Jobs". The challenge of the intervention process in Ghana has to do with inadequate, inconsistent and delayed fund releases, albeit, available well motivated human resource capacity of the TCU

1.05

COUNTRY REPORT ON PATTEC-NIGERIA CONTROL INTERVENTIONS/ACTIVITIES FROM 2020 - 2022

J. J. Ajakaiye

1.06

ZAMBIA: COUNTRY REPORT FOR THE PERIOD 2019 TO 2023

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SUMMARY

In Zambia, an estimated 245,000 km2 (35%) of the country's land area is tsetse-infested, and the country is affected by both animal and human trypanosomiasis. Animal trypanosomiasis (AAT) has been and remains the main reason for literally all the major interventions against tsetse flies since the colonial era. The cattle population is concentrated in the Southern, Western, Central and Eastern provinces, and the four provinces are the most affected by AAT – the country has 10 provinces. Consequently, historically and currently, activities against AAT have been and are undertaken mainly in these four provinces. Since 2019, the major tsetse and trypanosomiasis control activities have been focussed mainly on; (1) establishment of a national geo-database of tsetse and animal trypanosomiasis; (2) Tsetse and trypanosomiasis surveys aimed at updating the available data; and (3) preparation of a National Tsetse and Trypanosomiasis Control Strategy document'. A significant level of support to these activities has been provided under the COMBAT project. The other tasks undertaken include, 'a survey on trypanocide use and farmer opinion on the importance AAT in cattle keeping parts of the Kafue tsetse belt in Western Province', and also assignments aimed at addressing the challenges that led to rescheduling of implementation of an aerial spraying operation to control tsetse flies from 9,300km2, from one year to the next, since 2018 (to date) – so that the operation may be implemented as soon as possible. The report provides an overview of these activities.

1.07

COUNTRY REPORT FOR ZIMBABWE FOR THE PERIOD 2021-22

A. Mhindurwa

ABSTRACT

The objective was to eradicate tsetse in the remaining 3 000km2 smallholder settlement areas of Omay, Kanyati and Kanyemba Communal lands adjacent to tsetse-infested wildlife areas of Zimbabwe for sustainable rural development. Between 2021 and 2022, 18 204km2 was surveyed for tsetse using 1 331 odour baited epsilon traps and 32 tsetse fly rounds. Surveys were conducted along the entire tsetse front covering approximately 750km covering Gokwe North, Kariba, Hurungwe, Makonde, Mbire, Mudzi, and Chipinge Districts with tsetse catches ranging from 0-3 catches/trap/day for G. morsitans and 0-6 catches/trap/day for G. pallidipes. High tsetse catches were recorded in areas surrounding tsetse-infested Matusadona National Park and Human African Trypanosomiasis endemic areas of Makuti and Kanyemba. Integrated tsetse control measures were implemented involving the progressive deployment of 12 000 odour-baited deltamethrin-treated targets, deltamethrin dipped cattle and daily maintenance of tsetse traffic control barriers for two consecutive years. As a result, 1 300km2 was declared free from tsetse and trypanosomiasis in Kariba and Mbire Districts following prolonged post treatment extensive vector and disease surveillance.

Key words. Glossina morsitans morsitans, Glossina pallidipes, epsilon traps, surveys, Odour baited and insecticide treated targets, tsetse traffic control barriers, trypanosomiasis

1.08

TSETSE FLY AND TRYPANOSOMOSIS CONTROL ACTIVITIES IN BURKINA FASO WITHIN THE FRAMEWORK OF THE PATTEC INITIATIVE

Soumaïla PAGABELEGUEM, Burkina Faso

By the end of its first phase in 2013, PATTEC Burkina had been able to reduce fly densities by around 95-99% over an area of around 53,000 km², and to build an insectarium called Insectarium de Bobo-Dioulasso, which has been operational since 2016. As of 2017, 2 species of tsetse flies, Glossina palpalis gambiensis and G. morsitans submorsitans are being reared. From 2017 to the present day, the insectarium has supplied around 8.5 million sterile male G. palpalis gambiensis pupae in support of the AWIPM program in the Niayes of Senegal. An atlas to support the progressive control of tsetse-transmitted animal trypanosomosis in Burkina Faso was published in 2022. Burkina has been involved in COMBAT project activities since 2021, and the results show that 2 tsetse species, G. tachinoides and G. p. gambiensis have been captured in 31 departments at a density of 1.20 tsetse/day. Tabanids and stomoxes were captured at low densities. Out of 2811 animals sampled, the overall prevalence was 0.7%, including Trypanosoma vivax and T. congolense. For T. surra, blood samples were taken from 130 camels in the North and Sahel regions for PCR analysis. Although the risk of trypanosomiasis still appears to be low in the PATTEC zone, control measures are needed to eliminate T&T in this area and to continue in other parts of the country.

Keywords: Burkina Faso, tsetse and trypanosomosis control, ATLAS

1.09

TSETSE FLY AND TRYPANOSOMOSIS CONTROL IN SENEGAL

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From 1970 to 1980, trypanosomosis control campaigns were carried out in the Niayes area to remove tsetse flies, and more specifically Glossina palpalis gambiensis. The failure of these campaigns prompted the launch in 2006 of a new National Program for the Control of Tsetse Flies and Trypanosomoses in Senegal (PNLTTS), that aims a sustainable elimination of tsetse flies and trypanosomosis. The specific objectives are: 1) Elimination of tsetse flies and 2) Elimination of trypanosomiasis. Between 2007 and 2010, a feasibility study (entomological, parasitological, genetic and socio-economic studies) was carried out to characterize the Niayes area, and a database was set up. Based on the results of the feasibility study, which (i) confirmed the presence of Glossina palpalis gambiensis in the Dakar-Thiès-Kayar triangle and the disease it transmits (trypanosomiasis), and (ii) proved the isolated nature of the Niayes zone compared with other tsetse-infested areas, the first phase of the control program was launched in 2010. The following results were obtained: - Block 1 (Kayar) has been sanitized. No wild flies have been caught there since 2012; - tsetse fly populations have been reduced to over 99% in the rest of the project area, where ongoing elimination is based on the use of the sterile insect technique; - the prevalence of trypanosomiasis is zero in project intervention areas. Activities carried out in 2022 mainly involved vector control and entomological, parasitological and environmental monitoring in the Niayes area.

1.10

RAPPORT NATIONAL SUR LES PROGRES REALISES PAR LE MALI DEPUIS SEPTEMBRE2019

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Au Mali la superficie infestée par les mouches tsétsé est estimée à 200 000 km2. Les zone sous les activités de contrôle sont les cercles de Sikasso, Kadiolo et Kolondièba dans la region de Sikasso. La ppopulation humaine du Mali est estimée à 20,913 million d'habitants en 2020 (projection 2019). Le cheptel bovin du Mali était estimé à 12 848 696 têtes en 2021. Les maladies animales importantes classés par ordre sont entre autres, la rage, la maladie de Newcastle, le charbon bactéridien, les Trypanosomoses animales etc. La part de l'élevage/ l'agriculture au PIB national est de 35%. Le secteur agricole employ 80% des actifs Agricoles. Par manque de financement, aucune activités de suppression des T&T de gande envergure n'a été menée. Les progrès des activités de contrôle T&T mises en œuvre ont portés sur la mise à jour de la base de données nationale sur les T&T ; la participation d'un cadre de la DNSV au Stage de formation sur SIG, organisé par PATTEC-UA tenu à Dakar au Sénégal du 24 au 30 novembre 2019 ; la participation de deux cadres des services vétérinaires au cours régional de formation TN-RAF5087-EVT2106032, organisé par l'AIEA du 28 novembre au 2 décembre 2022 à Hararé au Zimbabwé ; la réception de matériels et équipements de laboratoire, mis à la disposition du Mali dans le cadre du RAF5087 ; la soumission d'un document de projet sur la lutte intégrée contre les trypanosomoses animales au gouvernement du Mali pour inscription au programme triennal 2024/2026 d'investissement et plaidoyer pour financement en 2024 ; l'élaboration et la mis en œuvre d'un projet de recherche sur l'Évaluation et gestion de la chimiorésistance aux trypanocides, financé sur budget national (2022-2025); la publication d'un article; la mise en œuvre du projet « Essai pilote a petite échelle pour l'exécution de la stratégie régionale de lutte contre les trypanosomoses et les maladies transmises par les tiques dans la zone économique spéciale Sikasso-Korhogo-Bobo Dioulasso (ZES-SiKoBo), dans le cadre du « Contrôle des Maladies Animales Transfrontalières en Afrique de l'Ouest,

Dans le cadre de la collaboration dans la lutte contre les T&T, le Mali a béfnéficié de l'appui des partenaires suivant : (PREDIP), l'AIEA

Les pprincipales contraintes observées sont: l'insuffisance des montants alloués sur le Budget Spécial d'Investissement (BSI) aux Services Vétérinaires;

l'insuffisance qualitative et quantitative des ressources humaines; l'insuffisance de la formation continue des agents et l'insuffisance de moyens logistiques et d'équipements.

En perspective, le Mali prévoie en 2024, la recherche de financement au plan stratégique de lutte contre les mouches tsé-tsé et les trypanosomoses animales au Mali.

I.11

SITUATIONAL ANALYSIS OF TSETSE AND TRYPANOSOMIASIS IN SOUTH SUDAN: A COUNTRY REPORT

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Abstract:

South Sudan is endowed with over 38.4 million heads of cattle, sheep and goats as well as camels. Human population is estimated at 12.5 million inhabiting in seven agro-ecological zones. Approximately, tsetse infested areas represent 38.5% in the greater Equatoria region and Akobo County of Jonglei State, bordering Ethiopia. Of which Glossina fuscipes fuscipes and G. morsitans submorsitans are the principal vectors. Elimination of Human African Trypanosomiasis (HAT) and Animal African Trypanosomiasis (AAT)/Nagana remains a challenging issue in the country particularly during COVID-19 pandemic. Progress made in the implementation of Progressive Control Pathways (PCP) for AAT/T&T has been promising. Although flies density is relatively elevated, prevalence of HAT is significantly reduced in some affected areas due to the pivotal role played chiefly by WHO. Drugs resistance to treat Nagana in cattle remains rampant which could be explained by misuse and or underdosage of the commonly used trypanocides .Key stakeholders and role players are urged to develop human capital and institutional capacities to support technical and managerial sustainability of the PCP for AAT and control of tsetse and HAT in South Sudan.
Keywords: Trypanosomiasis; Tsetse; PCP; Drugs resistance; South Sudan

1.12

TSETSE FLIES AND TRYPANOSOMIASIS IN TANZANIA: CURRENT STATUS AND CONTROL APPROACHES

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ABSTRACT

In 2018, Tanzania launched campaigns against vector and vector-borne diseases through application of acaricides and insecticides to livestock countrywide. This campaign goes along with construction and rehabilitation of dip tanks, supply of subsidized acaricides, sensitization of livestock keepers to dip their animals according to the calendar and establishment of Acaricide Application and Management Regulations, 2019 which provides for mandatory dipping. Although there have been no structured study and assessment on impact of dipping on the reduction of vector and vector-borne diseases control, reports from the field and laboratory shows that tick density has been reduced by 40% along with reduction of magnitude of tick-borne diseases by 30%. Tsetse flies and trypanosomiasis have been tremendously controlled in several areas where dipping regime is strictly followed. Laboratory assessment of blood smears submitted from 10 national veterinary laboratories during 2022/2023 shows that only 15 positive cases of trypanosomes were detected in cattle that were routinely sampled in wildlife livestock interface areas in particular from the Serengeti ecosystem areas. In these areas, tsetse flies are still a challenges in areas nearby the wildlife and forest reserves and causes annoyance and bites to livestock and humans. Nevertheless, cases of Human African Trypanosomiasis (HAT) are also scarce and have also remained in areas nearby the wildlife and forest reserves in particular western, southern highlands and northern parts of Tanzania. Records from National Medical Research Institute shows that incidences of AAT between 2018 and 2022 are 12 cases. In non-protected areas, tsetse control relies on the use of live bait and acaricides through dipping. To date, there are 3,100 functional dip tanks. In protected areas, tsetse control is through use of insecticide-treated targets. The battle against tsetse flies and trypanosomiasis has shown a good success. Continuous research and collaborations with various stakeholders will keep on informing the status of tsetse flies and trypanosomiasis in Tanzania and

make informed decisions against the diseases. Passive and active surveillance, drug use and the implementation of control measures are vital to reducing the threshold of trypanosomiasis and improve production and productivity of livestock, and safeguard the public health.

Keywords: Tsetse flies, trypanosomiasis, acaricides, livestock, wildlife, forest

1.13

STATUS OF TSETSE AND TRYPANOSOMOSIS CONTROL IN MALAWI

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1.14

NATIONAL REPORT ON PROGRESS IN CAMEROON

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Special Mission for tsetse flies Eradication

Abstract

The Mission Spéciale d'Eradication des Glossines (MSEG) is a specialised unit of Cameroon's Ministry of Livestock, Fisheries and Animal Industries. Since 1974, this structure has used all vector control methods apart from sterile insects. After the Abuja recommendations in 2019 and the level of implementation presented in 2021 in Naivasha-Kenya, Cameroon has pursued the guidelines of the 35th ISCTRC in 2022. We have thus consolidated our strengths by maintaining the state of pasture sanitation; entomological and parasitological surveys and control activities systems have been carried out in at-risk areas, as well as on dairy farms. Funding for the equipment of a mapping and medical and veterinary entomology laboratory is underway; the number and quality of staff has been provided and capacity building is ongoing. As a member of the COMBAT consortium, the MSEG has benefited from a number of training courses and has trained stakeholders with the aim of strengthening the epidemiosurveillance system and revising the control strategy based on the progressive control partway (PCP); the AAT atlas is nearing completion and the socio-economic study on the impact of trypanosomiasis in Cameroon is underway. There has been a noticeable involvement in One Health initiatives at national level. The COMBAT project is generating renewed interest in the structure, which is preparing to take stock of fifty years of research and control in 2024, and to look to the future, with the vision is a national reference structure for vector research and control, with a presence in the sub-region.

I.15

ASSESSMENT OF TSETSE FLY PREVALENCE IN CENTRAL AFRICAN REPUBLIC LIVESTOCK AREAS

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Summary :

Recent entomological surveys carried out in the breeding areas of the North-West, Center and East during the 2019 rainy season were used to assess tsetse fly pressure in order to set up an integrated vector control program. Monoconical vavoua traps were placed every 50 m in the gallery forests and around the plantations and left in place for a day. The geographical location of the traps was recorded using a GPS. A total of 500 traps were set, capturing 901 flies. Among these, we find the mechanical vectors G. stomox (521) and G. tabanidae (59) and the cyclic vectors Glossina fuscipes fuscipes (87), Glossina fusca congolensis (78) and Glossina morsitans submorsitans (156). Overall the apparent densities are higher (3.21) with peaks in certain localities (Bambari and Bossembélé), compared to the prospecting surveys which were carried out in the years 1989 and 1992 by GOUTEUX, and CUISSANCE which found respective DAPs of 2.64 and 2.82. The three species identified have also been described in the agro-pastoral zone of YEREMON (Bossembélé) by CUISSANCE, VALLAT, KOTA-NGUINZA and others (1992); the same species were identified and located in the map of FINELLE, 1963, in the surveyed prefectures. This shows that the flies have not left the areas for more than 60 years so they find their blood meal on other prey. The trypanosomiasis risk is real.

Key words: tsetse fly, savannah zone, apparent density, trypanosomiasis risk, agropastoral zone, DAP

1.16

REPORT ACTIVITIES TO HUMAN AFRICAN TRYPANOSOMIASIS CONTROL IN GUINEA

Introduction

In Guinea, the coastline is an endemic area for human African trypanosomiasis (HAT). The prefectures of Dubréka, Boffa and Forécariah are the active foci in which more than 400 patients were detected up to 2012. The introduction of a combination of two strategies has significantly reduced the number of cases in these foci, despite the various health crises the country has experienced. These are (i) screening/treatment of patients through mass medical surveys and passive surveillance in active and former foci (ii) vector control (VC) through the deployment of tiny targets in areas of human activity. This reduction in the number of cases has reached the WHO estimate of less than one case per ten thousand inhabitants since 2018. Today, the elimination of HAT as a public health problem seems to have been cushioned. Faced with this situation, approaches have been developed to adapt and strengthen the fight against HAT in the context of halting transmission in these foci.

Activities in the fight against HAT

The main control activities have been developed using strategies based on targeted and integrated control. These are mainly :

Active door-to-door screening in these 3 outbreaks and passive surveillance at the sites (active foci and former foci). During these door-to-door visits, a joint mission from the HAT/Palu programmes carried out screening for HAT and malaria and distributed LLINs. Activities relating to the OXA4 clinical trials continued, including patient enrolment and follow-up.

Targeted vector control through the reductive and reactive epidemiological deployment of tiny targets using a spatialized patient monitoring approach; the community deployment of tiny targets and the use of companion tiny target have been carried out.

As part of cross-border surveillance, screening sites and health workers from Sierra Leone have been identified, trained and equipped for this purpose. Following their launch, bimonthly meetings were jointly organised with agents from the Guinean sites. During these meetings, RDT-HAT-positive cases were notified and the use of these tests and stocks were evaluated and reallocated by site as required. All positive subjects were invited to the various treatment

centres for parasitological confirmation tests. A Guinean team was sent to confirm cases in Sierra Leone.

Results

In the context of vector control, 1,088 tiny targets have been installed, including 4,858 in the Boffa focus, 1,729 in Dubréka and 3,601 in Forécariah, with a 36% reduction in the number of tiny targets. An entomological evaluation carried out in May 2023 recorded a reduction in tsetse fly densities of 76.77% in Dubréka, 88.75% in Forécariah and 48.45% in Boffa in the east (where there was a 55% reduction in the number of tiny targets) and 88.41% in the west. No microscopic infection was observed in nearly 60% of the flies caught and dissected. Spatial monitoring of 9 patients (4 in Dubréka and 5 in Forécariah) made it possible to identify pockets and localities not covered by LAV, around which a targeted reactive deployment of 76 tiny targets was carried out.

During the period from January to August 2023, out of a population of 1,911 tested passively and actively, 19 cases were detected in all three foci, including 10 in Dubréka, 9 in Forécariah and no cases were reported in Boffa. According to the screening method, 10 were in the passive and 9 in the active phase. Of these patients, all in the second phase, 18 were treated (with Fexinidazole and NECT) and 1 refused treatment. In the Sierra Leone sites, out of 267 people tested, 13 were positive on the TDR-THA, 9 of whom were seen for confirmation, and no cases were confirmed parasitologically. For the OXA4 clinical trials, 182 consents were signed, 176 included and 6 excluded.

1.17

ESWATINI T&T SURVEILLANCE ACTIVITIES 2021 TRYPANOSOMIASIS & TSETSE FLY

*ZANELE MILLY VILAKATI**

In the 1940s two types of flies invaded Eswatini. There were Glossina Pallidipes in the Southern Part whilst the east was infested with Glossina Austeni. In the 1950s they were eradicated and a survey conducted in 2008 showed that only the Mhlumeni pocket remained. The pocket is in Mlawula Nature Reserve and consists of Glossina austeni.

Trypanosoma Congolense was diagnosed in one animal from Mhlumeni (224) diptank and serological examinations picked up reactors from Mhlumeni (224) and Majembeni (216) dip tanks. Their Genetic typing showed that they were not related to the G.austeni flies found in KwaZulu Natal, South Africa. Parasitological Surveys were conducted from 2016 to 2020 with negative results.

The objectives of the Surveys were to determine whether the trypanosoma is present or not in areas which are highly suitable for tsetse fly infestation, such as Lavumisa in the South extending to Lomahasha in the North along the country's eastern frontier.

In 2017, due to shortage of resources the surveillance activities were restricted to some dip tanks which were quarantined in 2016 for illegal importation of cattle within the areas considered to be highly infested by Tsetse fly and had the chance of introducing trypanosomiasis and tsetse fly in the country from neighbouring infested countries. Mkhaya Diptank in Siphofaneni was included in 2018 due to the introduction of new buffaloes from Zambia.

On 2019 April an Entomological survey using H-traps was also resumed at Mlawula Siphiso Valley for collecting Tsetse flies for genetic typing, comparisons with flies from Mozambique and for the determination of their infective status and were discontinued on 2020 March. Flies collected in 2019 and 2020 were analyzed at the International Atomic Energy Agency 2 (IAEA) in Austria as part of a worldwide study to determine the prevalence of Trypanosome infection, tsetse microbiota (Sodalis, Wolbachia and Spiroplasma infection) and the Salivary gland Hypertrophy virus in tsetse flies. No trypanosome and or Sodalis infection were detected from the Eswatini flies.

The flies were then sent to the International Atomic Energy Agency (IAEA) in Austria to be included in the DNA bank. Surveillance activities in 2021

Entomology survey The Entomological surveys which were started in 10/04/2019 at Mlawula were discontinued in 20/03/2020. Flies collected in 2019 and 2020 were analyzed at the International Atomic Energy Agency 2 (IAEA) in Austria as part of a worldwide study to determine the prevalence of Trypanosome infection, tsetse microbiota (Sodalis, Wolbachia and Spiroplasma infection) and the Salivary gland Hypertrophy virus in tsetse flies. No trypanosome and or Sodalis infection were detected from the Eswatini flies. Parasitology survey A parasitological survey was done along the country's eastern frontier targeting diptanks along the Lavumisa to Lomahasha Corridor. Habitat Suitability Maps

I.18

CURRENT SITUATION OF HUMAN AFRICAN TRYPANOSOMIASIS (HAT) IN TANZANIA

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ABSTRACT

Human African trypanosomiasis (HAT)/ sleeping sickness is a vector-borne disease caused by two sub-species of the parasitic protozoa Trypanosoma brucei (T. b. gambiense and T. b. rhodesiense) which occurs in two forms (Gambian and Rhodesian form). To date, only the Rhodesian form is confirmed to occur in Tanzania although there is a possibility of having the Gambian form from neighbouring countries due to day-to-day interaction between people living in the countries having the Gambian form. Trypanosomes are transmitted to humans by the infected bite of various species of tsetse fly (genus Glossina). Transmission of the disease takes place in sub-Saharan Africa in discrete endemic areas or foci, within the geographic distribution of the tsetse fly and more than 36 countries in SSA are at risk. In Tanzania, the current reports of sleeping sickness come from the northern part of the country (Ngorongoro, Serengeti, and Tarangire), Western part (Tabora, Kigoma, and Katavi region). These foci are linked with national parks, game reserves, and livestock-wildlife interfaces. Between 2011 and 2020 a total of 21 cases were recorded, we are reporting the current HAT situation in Tanzania up to 2022.

1.19

ELIMINATION OF HUMAN AFRICAN TRYPANOSOMIASIS IN CAMEROON: CHALLENGES AND LESSONS LEARNT.

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Introduction:

Human African Trypanosomiasis (HAT), remains a debilitating disease of public health importance in Cameroon. Notifying less than 1 case per 10000 inhabitants in all health districts within 5years and an adequate HAT control and surveillance activities are two important indicators defined by WHO for the elimination of HAT as a public health problem. We describe the challenges faced by the Cameroon national HAT control program as it strives to attain these indicators and lessons learnt.

Material and methods: We reviewed the national HAT control program's annual activity reports and action plans from 2013 to 2022 and analyzed the national HAT database for the same period. The review focused on describing the integrated passive surveillance, active case detection, case management and vector control following the WHO HAT elimination strategy. We analyzed data using Microsoft Excel 2016.

Results:

Overall, 43(47.8%) planned activities were implemented, 23(51.1%) screening campaigns for active case detection, 17(48.6%) supportive supervisions to strengthen integrated passive surveillance in HAT foci and implemented vector control activities only in two of the seven foci from 2019 to 2021. Altogether, 72 HAT cases were detected, 54(75%) through active surveillance with 62% average population coverage and 9 cases per 10000 persons tested. Altogether,

71(98.6%) cases were treated.

Conclusion: HAT control activities are sub optimal, with a low implementation of planned activities. High staff turnover in HAT foci, limited financial and material resources and little engagement from the government were the main challenges. Addressing these challenges is mandatory to achieving HAT elimination in Cameroon.

Keywords : Challenges, HAT Control Program, Cameroon.

1.20

THE CHALLENGES FACING THE NATIONAL HAT CONTROL PROGRAMME IN EQUATORIAL GUINEA

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Abstract

"After the long journey, we have reached our goal, and the goal of our journey is awareness of the long road traveled until 2022 - the time of achieved Elimination."

"To achieve the elimination goal, the National Trypanosomiasis Control Program (PNCTHA) engaged in a long struggle to respond to the challenges encountered; and it has finally achieved this elimination result thanks to the efforts deployed by actors on the field, by the Ministry of Health and Social Welfare, by collaborators and partners."

During the years 2016-2020, the national indicator of elimination of HAT as a health problem, as indicated by WHO, was an incidence of < 1/10,000 population in all health districts in the country where HAT is considered endemic, namely Luba, Rio Campo, Kogo and Mbini. Between 2020 and 2022, the National Program reported 18 HAT cases, which indicates a lower prevalence compared to the 1990's.

Now, WHO has just declared, on June 10, 2022, that Human African trypanosomiasis as a public health problem has been eliminated from Equatorial Guinea, hence the rationale for this article.

Introduction

The first description of the endemic situation in the country dates back to 1910, and was carried out by Dr. Pittaluga. HAT surveillance and control programs have been implemented in Equatorial Guinea since 1930, resulting in a drastic reduction in disease prevalence at the end of the 1960's (Penchenier et al., 1996). Equatorial Guinea did not escape the great epidemic of the 1960's which ravaged sub-Saharan Africa. In the mid-1980s, alerted by the high number of cases of trypanosomiasis diagnosed in the Luba Provincial Hospital, the Ministry of Health and Social Welfare in Equatorial Guinea (MINSABS) put in place the National Trypanosomiasis Control Program (PNCTHA). Moreover, with the technical and economic support from the Spanish Agency for International

Cooperation for Development (AECID), the Trypanosomiasis Control Center (CCT) was established in Bata on the mainland.

In the early years of operation, the Program examined a large portion of the population living in those foci, detecting 508 cases in 1985 and 386 in 1986 (Simarro et al. 1988). In subsequent years, the incidence of cases decreased thanks to active screening and treatment of all cases (Simarro et al., 1991b). In relation to epidemiology and geographical distribution today, there are four historically declared sleeping sickness foci in Equatorial Guinea, namely: Luba, Rio Campo, Kogo and Mbini (Simarro et al. 1988). Apart from these four historical foci, no new HAT foci have been detected so far.

Methodology

Since the year 2000, a national policy document has defined rules, strategies and activities for the Program: "Manual of Standards for the National Trypanosomiasis Control Program". The latest update was performed in 2010 although the PNCTHA had incorporated all recommendations by WHO in both diagnosis and treatment. The mobile team uses the diagnostic algorithms.

The National HAT Control Program (PNCTHA) adopted active screening strategy on the field:

a. awareness-raising and brochure distribution to authorities and the population in the foci to be screened
b. Door-to-door strategy to screen all people in each household
c. Protocol applied to unconfirmed HAT-positive people, taking samples for trypanolysis, which were sent to Cirdes (Bobo Dioulasso)
d. Diagnostic algorithm used by the Program for both serology and parasitology:

CATT (Card Agglutination Trypanosomiasis Test)

RDT (Rapid Diagnostic Test)

TBS (Thick blood smear)

LNA (Lymph node aspirate smear)

CTC (Capillary Tube Centrifugation)

m-AECT (mini-Anion Exchange Centrifugation Test)

LP (Lumbar puncture) and MSC (Modified simple centrifugation)

VC (vector control)

Conclusion

The National Program is committed to maintaining the WHO roadmap on sleeping sickness epidemiological surveillance. Such strong epidemiological surveillance has led us to reach achieved elimination today. As another control front line, vector control (VC), mono-pyramidal traps have not been deployed on the field since 2010, while this activity must be undertaken at the request of the population at risk, taking into account the known cardinal importance of achieved elimination.

1.21

UGANDA ELIMINATES GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS (G-HAT) AS A PUBLIC HEALTH PROBLEM

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Human African trypanosomiasis also referred to as sleeping sickness is a parasitic Neglected Tropical Disease, transmitted by tsetse flies. It mainly affects populations living in remote rural areas. There are two forms of sleeping sickness ie Trypanosoma brucei gambiense which causes a chronic illness (takes months to years) and Trypanosoma brucei rhodesiense which causes an acute illness (weeks to months). Uganda is the only country that has both forms of the disease.

The gambiense type of sleeping sickness has been a big public health burden in West Nile region for several decades characterized by outbreaks putting at risk over two million people in 10 foci and causing fatality as well. The 10 foci include, Adjumani, Moyo, Yumbe, Koboko, Amuru, Yumbe, Maracha, Terego, Arua and Madi Okollo. .Following interventions by various actors in both government and nongovernmental organizations, Uganda has achieved elimination of chronic, Gambiense, form of sleeping sickness as a public health problem. This declaration was made by the World Health Organization in April 2022 and it is two years since a confirmed gambiense sleeping case was reported. The key elimination strategies were community and health facility based surveillance for detection of cases, case management, Vector control (Tsetse fly control) and community sensitization in the endemic districts/foci. The current focus is to strengthen strategies to sustain these gains and to achieve elimination of transmission (EoT) by 2030. The country maintains deliberate efforts for rhodesiense control/ elimination

1.22

CONDUCTING HAT ACTIVE SCREENING WITH RAPID DIAGNOSTIC TESTS: THE GUINEAN EXPERIENCE (2016-2021)

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Abstract

Strategies to detect Human African Trypanosomiasis (HAT) cases rely on serological screening of populations exposed to trypanosomes. In Guinea, mass medical screening surveys performed with the Card Agglutination Test for Trypanosomiasis have been progressively replaced by door-to-door approaches using Rapid Diagnostic Tests (RDTs) since 2016. For the last 5 years, the Guinean HAT National Control Program had to combine three different RDTs: the SD-Bioline-HAT, the HAT-Sero-K-SeT, and recently the Abbott-Bioline-HAT-2.0. Here, we assess the performance of these RDTs, through the analysis of both prospective and retrospective data. A parallel assessment showed a higher positivity rate of Abbott-Bioline-HAT-2.0 (6.0%, n=2,250) as compared to HAT-Sero-K-SeT (1.9%), with a combined positive predictive value (PPV) of 20.0%. However, an evaluation of Abbott-Bioline-HAT-2.0 alone revealed a low PPV of 3.9% (n=6,930) which was surpassed when using Abbott-Bioline-HAT-2.0 in first line and HAT-Sero-K-SeT as a secondary test before confirmation (combined PPV=44.4%). A retrospective evaluation of all 3 RDTs was then conducted on 189 plasma samples from the HAT-NCP biobank, confirming the higher sensitivity (94.0%) and lower specificity (83.6%) of Abbott-Bioline-HAT-2.0 as compared to SD-Bioline-HAT and HAT-Sero-K-SeT. A comparison of Abbott-Bioline-HAT-2.0 and malaria-RDT positivity rates on 479 subjects living in HAT-free malaria-endemic areas further revealed that a significantly higher proportion of subjects positive in Abbott-Bioline-HAT-2.0 were also positive in malaria-RDT, suggesting a possible cross-reaction of Abbott-Bioline-HAT-2.0 with malaria-related biological factors in about 10% of malaria cases. Overall, Abbott-Bioline-

HAT-2.0 seems suitable as first line RDT in combination with a second HAT RDT to prevent confirmatory lab overload and loss of suspects during referral for confirmation.

HUMAN AFRICAN TRYPANOSOMIASIS (HAT)

HAT DIAGNOSIS

2.01

A NANOBODY-ANTIBODY HYBRID SANDWICH TECHNOLOGY OFFERS ALTERNATIVE APPROACH TO IMMUNODIAGNOSIS OF TRYPANOSOMIASIS

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Abstract

Scarcity of reliable diagnostics for trypanosomiasis impedes control of the disease. The existing high-sensitive tests for trypanosomiasis are costly, complicated, rely on electricity and require trained operators. Altogether, these attributes compromise the utility of available trypanosomiasis diagnostics in rural areas where the disease is found. Affordable point-of-care (POC) tests would improve control of trypanosomiasis by allowing prompt case detection and treatment intervention. This study explores development of an antigen (Ag) detection lateral flow assay (LFA) for trypanosomiasis using a combination of nanobodies (Nb) and monoclonal antibodies (mAb) with the latter being integrated to overcome difficulties faced with conjugation of detecting Nb to nanoparticles. Thus, an Alpaca was immunized with soluble lysate of T. congolense (TC13). From the library, the most potent Nb, Nb474, was selected in an unbiased approach, and the target Ag was subsequently purified by a pull-down assay and identified by mass spectrometry. Next, the identified Ag, T. congolense glycosomal fructose-1,6-bisphosphate aldolase (TcoALD), was recombinantly produced for immunization of a mouse. A hybridoma library was constructed and screened for binders against recombinant TcoALD, identifying a mAb (IgM8A2) as a native TcoALD binder that can work in conjunction with Nb474 in a sandwich ELISA setup. At this stage, the translation of the ELISA to a Nb474-IgM8A2 hybrid LFA is ongoing. The hybrid technology offers alternative approach to development of devices for diagnosis of trypanosomiasis and other infectious diseases.

Keywords: Trypanosomiasis, diagnosis, Nanobody, monoclonal antibody, fructose-1,6-bisphosphate aldolase.

2.02

SPECIFICITY OF SEROLOGICAL SCREENING TESTS FOR DIAGNOSIS OF GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS IN CÔTE D'IVOIRE AND GUINEA

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Serological tests play a crucial role to diagnose gambiense human African trypanosomiasis (HAT). Variability in reported specificities, the introduction of new rapid diagnostic tests (RDT) and the hypothesis that malaria decreases RDT specificity, led us to evaluate the specificity of 5 HAT screening tests. Venous blood samples from 1,095 individuals from Côte d'Ivoire and Guinea were tested with commercial (Bioline HAT 2.0, HAT Sero-K-SeT, CATT/T.b. gambiense) and experimental (HAT Sero-K-SeT 2.0, DCN) HAT screening tests and with a malaria RDT. Individuals negative to all 5 HAT tests were considered HAT free, while seropositives to any screening test underwent microscopy, serological (trypanolysis, indirect ELISA) and molecular (SHERLOCK, RT-qPCR multiplex, PCR) laboratory tests. One HAT case was confirmed microscopically. Test specificities (n=1,094) were 98.9% for CATT/T.b. gambiense, 86.7% for HAT Sero-K-SeT, 82.1% for Bioline HAT 2.0, 78.5% for HAT Sero-K-SeT 2.0 and 78.2% for DCN. Although all HAT screening tests were less specific in malaria positive (n=277) than in malaria negative individuals (n=817), differences were not significant. In HAT seropositives to any screening test, specificity of serological and molecular laboratory tests were 98.7-100% (n=399) and 93.0-100% (n=302), respectively. In conclusion, CATT/T.b. gambiense is more specific than the 4 HAT

RDTs. The HAT Sero-K-SeT is more specific than other RDTs, but the results suggest that test specificity, in particular of experimental RDTs, could easily be improved. Further comparative evaluation of the diagnostic performance of laboratory tests, in particular the molecular tests, seems indicated.

2.03

CONDUCTING HAT ACTIVE SCREENING WITH RAPID DIAGNOSTIC TESTS: THE GUINEAN EXPERIENCE (2016-2021)

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Abstract

Strategies to detect Human African Trypanosomiasis (HAT) cases rely on serological screening of populations exposed to trypanosomes. In Guinea, mass medical screening surveys performed with the Card Agglutination Test for Trypanosomiasis have been progressively replaced by door-to-door approaches using Rapid Diagnostic Tests (RDTs) since 2016. For the last 5 years, the Guinean HAT National Control Program had to combine three different RDTs: the SD-Bioline-HAT, the HAT-Sero-K-SeT, and recently the Abbott-Bioline-HAT-2.0. Here, we assess the performance of these RDTs, through the analysis of both prospective and retrospective data. A parallel assessment showed a higher positivity rate of Abbott-Bioline-HAT-2.0 (6.0%, n=2,250) as compared to HAT-Sero-K-SeT (1.9%), with a combined positive predictive value (PPV) of 20.0%. However, an evaluation of Abbott-Bioline-HAT-2.0 alone revealed a low PPV of 3.9% (n=6,930) which was surpassed when using Abbott-Bioline-HAT-2.0 in first line and HAT-Sero-K-SeT as a secondary test before confirmation (combined PPV=44.4%). A retrospective evaluation of all 3 RDTs was then conducted on 189 plasma samples from the HAT-NCP biobank, confirming the higher sensitivity (94.0%) and lower specificity (83.6%) of Abbott-Bioline-HAT-2.0 as compared to SD-Bioline-HAT and HAT-Sero-K-SeT. A comparison of Abbott-Bioline-HAT-2.0 and malaria-RDT positivity rates on 479 subjects living in HAT-free malaria-endemic areas further revealed that a significantly higher proportion of subjects positive in Abbott-Bioline-HAT-2.0 were also positive in malaria-RDT, suggesting a possible cross-reaction of Abbott-Bioline-HAT-2.0 with malaria-

related biological factors in about 10% of malaria cases. Overall, Abbott-Bioline-HAT-2.0 seems suitable as first line RDT in combination with a second HAT RDT to prevent confirmatory lab overload and loss of suspects during referral for confirmation.

2.04

PHASE I EVALUATION OF THE ABBOTT BIOLINE HAT 2.0, A RAPID DIAGNOSTIC TEST FOR HUMAN AFRICAN TRYPANOSOMIASIS BASED ON RECOMBINANT ANTIGENS

Sara Tablado Alonso, Sylvain Biéler, Raquel Inocêncio Da Luz, Paul Verlé, Philippe Büscher, Epco Hasker

Rapid diagnostic tests (RDTs) have played a key role in the screening of gambiense-HAT (gHAT). Currently, RDTs are produced using native variable surface glycoproteins (VSG) but for reasons of cost, standardization, animal welfare and biosafety, Abbott developed the Bioline HAT 2.0 RDT in which native VSG are replaced by recombinant N-terminal domain of VSG LiTaT 1.5 and recombinant invariable surface glycoprotein 65 (ISG65). The objective of this retrospective study was to evaluate the sensitivity (SE) and specificity (SP) of the Abbott Bioline HAT 2.0, to demonstrate its non-inferiority to the first generation of RDTs, i.e. SD Bioline HAT and HAT Sero-K-SeT, and to compare its diagnostic accuracy with CATT and immune trypanolysis (TL), with TL being considered as the reference standard.

Plasma samples from 150 HAT patients and 150 endemic controls collected in Chad, DRC, Guinea and Uganda were obtained from the WHO HAT Specimen Bank. All tests (CATT, SD Bioline HAT, Abbott Bioline HAT 2.0, HAT Sero-K-SeT and TL) were performed according to manufacturer's instructions.

The sensitivity of the Abbott Bioline HAT 2.0 was 96.8% [95%CI: 92.7-99.0] while its specificity was 79.0% [95%CI: 71.4-85.4], compared to CATT SE/SP (92.3%/87.4%), SD Bioline HAT (96.8%/72.0%) and HAT Sero-K-Set (99.4%/79.7%).

The performance of the Abbott Bioline HAT 2.0 is similar to that of currently available RDTs. However, considering the declining prevalence of HAT and the Target Product Profile for a gHAT individual test to assess infection in low prevalence settings as proposed by WHO, specificity should be improved to exceed 95% to minimize the proportion of false positivity.

2.05

ASSESSMENT OF RECOMBINANT HAT-RDT SPECIFICITY

Sara Tablado Alonso, Raquel Inocêncio da Luz, Paul Verlé, Philippe Büscher, Dieudonné Mumba Ngoyi, Erick Mwamba Miaka, Epco Hasker

Rapid diagnostic tests (RDTs) are instrumental to achieve the 2030 goal of elimination of gambiense-HAT (gHAT) transmission. New generation RDTs have been developed in which native variable surface glycoproteins (VSG) are replaced by recombinantly expressed trypanosome proteins.

This study aimed at assessing the diagnostic performance of the recombinant RDTs in the field with particular focus on their specificity, given the low endemicity of gHAT today.

During routine screening rounds by mobile units in the DRC, all consenting ≥12 years-old individuals were invited to participate and provide a venous blood sample to perform CATT and three RDTs (SD Bioline HAT 2.0, HAT Sero K-Set and HAT 2.0 Sero K-Set). The remaining blood was shipped to the national reference laboratory for HAT at the Institut National de Recherche Biomédicale (INRB), for further testing on inhibition-ELISA, immune trypanolysis and qPCR to determine whether any diagnosis of gHAT was missed by the parasitological examination of RDT positives in the field.

In Kwilu and Lomami provinces, respectively 591 and 913 participants were enrolled. With immune trypanolysis as reference test, the specificity of the HAT Sero K-Set was 91.8% (90.2-93.1); of the recombinant HAT 2.0 Sero K-Set 88.7% (86.9-90.3) and of SD Bioline HAT 2.0 76.6% (74.3-78.8). Testing in qPCR and inhibition-ELISA is still ongoing.

Based on the available results, none of the RDTs reached 95% specificity as recommended by the WHO Target Product Profile for an individual gHAT test to assess infection in low prevalence settings. Improving the specificity of the recombinant RDTs is necessary.

2.06

INNOVATING PASSIVE SCREENING FOR SLEEPING SICKNESS: ASSESSING POST HOC CONFIRMATION TESTS IN A DRC PILOT STUDY

Lucas Verstraeten

Objective: For eliminating gambiense human African trypanosomiasis by 2030, screening of patients consulting health facilities (passive screening) is important. It complements (re)active screening of population at risk and facilitates post-elimination surveillance. However, in the weak healthcare system of DRC, challenges arise from operator-dependent microscopy and declining proficiency of lab-technicians amid declining endemicity. To address this, we piloted a passive screening model in Kasaï-Oriental, Lomami, and Sankuru provinces, based on three post-hoc confirmation tests (Trypanolysis, iELISA, PCR) alongside microscopic confirmation.

Methods: We selected 23 healthcare structures across the provinces, categorizing them based on numbers of reported HAT cases. Microscopy and videographic quality assurance were implemented in 13 high-prevalence hospitals. All patients with suggestive symptoms were screened with a rapid diagnostic test, those testing positive had blood samples collected either for microscopy on the spot and/or only for confirmation at a reference laboratory. Cases that tested positive in microscopy, Trypanolysis, or PCR were defined as confirmed and thus qualified for treatment.

Results: After three months, preliminary results in Kasai-Oriental and Lomami were as follows: out of a total of 15189 consultations, 822 were screened, and 112 were positive. Among these serological suspects, 62 underwent microscopic examination, and all underwent post hoc confirmation analyses. Zero patients tested positive in microscopy, 7 in Trypanolysis, 0 in PCR, and 2 in iELISA.
Conclusion: This project assessed various confirmation methods, proposing a scalable passive screening strategy for DRC. Post-hoc confirmation has potential as an alternative to on-the-spot microscopy in passive screening.

2.07

IMMUNOTRYPANOLYSIS, THE KEY FOR HAT ELIMINATION BY 2030 IN DEMOCRATIC REPUBLIC OF THE CONGO

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The immunotrypanolysis test (TL) requires rational follow-up of seropositives for effective elimination of Human African Trypanosomiasis (HAT). Several gambiense foci formerly called extinct or silent and not visited by the Control Program could jeopardize the elimination of Human African Trypanosomiasis by 2030. This lack of screening is due to a budgetary and security barrier. In all these foci, the role of animal reservoir is largely underestimated while emerging pathogens resurface. The trypanosome is one of the immunologically complex pathogens. In 2022, the HAT National Programme screened 9,376 seropositives for a total population examined of 1,791,977. Among the provinces with a few inactive outbreaks are Kongo Central and Kinshasa, where the HAT National Programme detected 1,127 seropositives none confirmed parasites. During an investigation of onchocerciasis, neurocysticercosis and rabies in these foci in Kongo Central, 372 sera were collected; 22 were from epileptic patients, 50 from dog bite victims, 168 from pigs, 63 from cattle and 69 from dogs. These samples were tested with Coris lateral flow then with TL among which the total of the samples screened in one or the other test revealed positive with Coris/and with TL (Total: Coris/TL): (Human 72: 2 /2); (Pig 166: 83/2); (Dog 68:31/1); (Bovine: 63: 22/3). These results convince us that the disease is present in these outbreaks and the animal reservoir of the brucei species is not to be underestimated while the number of new cases fluctuates each year.

Key words: immunotrypanolysis; HAT; Elimination

2.08

LIGHTING THE PATH TO ELIMINATION: FLUORESCENT IMMUNE TRYPANOLYSIS FOR GHAT SERODIAGNOSIS

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Abstract:

The elimination of Human African Trypanosomiasis (HAT) caused by Trypanosoma brucei gambiense in West and Central Africa, necessitates reliable serodiagnostic tests. For a persistent infection in mammals, trypanosomes elude the immune system via antigenic variation, altering their variant surface glycoprotein (VSG) coat. Serological tests are the primary diagnostic tools for HAT, leveraging antibodies against VSGs, specifically T.b. gambiense VSGs LiTat 1.3 and LiTat 1.5, through point-of-care tests like CATT and RDTs.

Despite significant strides in HAT control and treatment contributing to a drastic drop in prevalence, specificity remains paramount in serodiagnosis when disease prevalence is low. Among the most specific is the immune trypanolysis test (ITL), which involves exposing live T. b. gambiense clones to human serum. However, the conventional ITL test poses several challenges, including biohazard risks and limited throughput.

To address these constraints, we introduce a novel ITL test employing transgenic Trypanosoma brucei brucei strains expressing gambiense VSGs. These non-human infective parasites are easily cultivated in vitro, reducing biosafety concerns and animal usage. Furthermore, the incorporation of fluorescence genes permits simultaneous visualization and differentiation of reactions against LiTat 1.3 and LiTat 1.5. The assay readout can be obtained using epifluorescence microscopy or fluorescent imaging devices, transforming the lysis process into a kinetic assay that observes lysis at multiple timepoints during incubation.

Proof-of-principle of our novel fluorescent ITL was delivered using a set of gHAT cases and controls and demonstrating high concordance with conventional ITL, thus showing considerable promise to improve gHAT diagnosis in support of ongoing elimination efforts.

HAT SCREENING STRATEGIES AND ELIMINATION

2.09

ACTIVE SEARCH STRATEGY FOR HUMAN AFRICAN TRYPANOSOMIASIS CASES (HAT) IN VILLAGES WITHOUT NEW CASES FOR 10 YEARS BY A HEALTH DISTRICT TEAM.

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Objective

Elimination also requires the integration of control activities in health zones endemic to HAT. One of t activities that can be monitored is the regular survey of so-called non-endemic villages. The objective is to share an active search strategy for HAT cases in non-endemic villages 10 years ago by the rural health district team of Bagata, Kwilu province in the DRC.

Methodology

In 2021, Bagata health zone team in the DRC identified 19 non-endemic villages from more than 10 years ago; of which 9 were the subject of serological screening activities combined with those of sensitization by a health zone team. The seropositive subject was brought back for a parasitological confirmation examination at the general reference hospital.

Results and discussion

7,310 people were examined out of a total census population of 8,620 people in the 9 villages visited, i.e. a participation rate of 84%. Of 67 identified HAT seropositive subjects, 51 responded to the parasitological examination, of which 7 were parasitological confirmed to have HAT. 4 Villages have become endemic again.

Conclusion

In this period of low prevalence and declining funding, targeting the prospecting of non-endemic villages by a health district team would be one of the complementary and sustainable way to be exploited to also find the last HAT cases, avoid re-emergence and accelerate elimination.

2.10

HUMAN AFRICAN TRYPANOSOMIASIS CHALLENGE AND PERSPECTIVE OF UNCONFIRMED SEROLOGICAL

Rashidi Assani Samuel, Julienne Tshowa, Florent Mbo, Prof Alain Panya, et Erick Miaka

Abstract

Human African trypanosomiasis or sleeping sickness, is a parasitic vector borne disease transmitted by the bite of infected tsetse fly.

In the 20th century, several communities in African countries were ravaged by epidemies of this disease, but grace to the mutual effort of national control programme, technical and financial partners under WHO coordination, the prevalence has fallen drastically.

The Republic Democratic of Congo (DRC), the country with the highest burden of disease worldwide has also seen its prevalence reduced by more than 85% compared to ten years ago.

We can assume that this notable decrease of the prevalence could be attributed to the fundamental approach involving screening, parasitological confirmation, and appropriate treatment. This strategic framework has played a pivotal role in the substantial reduction in disease burden to this low level.

However, it has been observed that the effectiveness of the approach has certain limitations related to the sensitivity of parasitological confirmation. This limitation arises from the absence of an easy to apply and fully sensitive diagnostic tool capable of definitively confirming the complete absence of the parasite. Consequently, some individuals who test positive in a screening test remain unconfirmed, posing a potential risk as carriers of the parasite and contributing to the continuous transmission cycle.

To the agenda set up by WHO is the achievement of sustainable elimination by 2030 as a primary goal, necessitating the adaptation of the interventions in this context of low prevalence. In order to address this challenge, we seek to initiate discussion of serological positive suspect concerning therapeutic approach. To this end, we ask the following research question: is serology a potential tool for presumptive diagnosis?

The main purpose of this study is to appraise the temporal trends in specificity and positive predictive value of serology for gHAT case in different endemic

regions of control program within DRC from 2010 to 2022.

We conducted a descriptive study using quantitative methodological approach. We used the routine data reported by the provincial coordinations of DRC's national control program from 2010 to 2022.

A scatter plot and line of comparison between proportion of confirmed gHAT cases detected among the persons actively screened and proportion of serological gHAT suspects were presented for the whole country and by coordination. The temporal trend of proportion of confirmed gHAT cases among serological suspects as well as the table of absolute number of serological suspects in different endemic regions.

The result of our study shows a remarkable decrease infection rate until, whereas the proportion of serological suspects among populations screened was not associated to this drop the infection rate for the whole country was 0.020%, which is 2 times higher than the WHO threshold of 0.01%.

On the other hand, we observe a large number of serologically positive suspects who remain unconfirmed. Currently PPV is at 1.7% Currently PPV is at 1.7%, it was much higher. This trend is important and also whether there is regional variations.

The study assumes confirmation of the case detection limit, especially when the prevalence of the disease is too low, the serological suspects unconfirmed remains and concerns(23,31).

The PPV of our study was much lower than that found by Francesco Checchi et al in Kajokeji south Sudan (PPV 22%) and by Simarro in Angola (PPV 52%).

In conclude, our study reveals a notable decline in the prevalence of gHAT over time. it was noted that the proportion of serological suspects did not align with this downward trend.

The advent of an effective and less toxic drug would be an opportunity to circumvent the limit of diagnostic sensitivity and address the challenge of therapeutic orientation of serological suspects.

2.11

ACTIVE SEARCH FOR UNCONFIRMED HAT SEROLOGICALLY POSITIVE INDIVIDUALS WITH TRYPANOLYSIS TEST FROM 2019 TO 2022 IN THE DEMOCRATIC REPUBLIC OF CONGO

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Passive screening of populations living in areas affected by sleeping sickness is one of the strategies of the National Sleeping Sickness Control Program (PNLTHA) of the Democratic Republic of Congo (DRC) for the elimination of human African trypanosomiasis (HAT). Despite passive and active screening by health facility staff in endemic areas, however, unconfirmed HAT-seropositive individuals may still contribute to the reemergence of the disease in the absence of follow-up. A network to support active assessment of unconfirmed HAT-seropositive cases was set up by the PNLTHA, DRC. Within this network, health facilities identified HAT-seropositive individuals using rapid diagnostic tests and/or CATT, and then performed (or referred for) parasitological tests. Samples from unconfirmed HAT-seropositive individuals were sent to the National Laboratory for Biomedical Research for trypanolysis. Individuals with HAT-positive trypanolysis were followed at health facility level for parasitological confirmation and treatment. From 690 filter paper samples sent and analysed by trypanolysis, 34 were positive (4.9%), of whom 8 HAT-positive cases were treated (23.5%) after follow-up for parasitological confirmation. In the context of decreasing prevalence of HAT cases, trypanolysis is one approach for the follow-up and surveillance of unconfirmed HAT-seropositive individuals in endemic areas.

2.12

THE EFFECTIVENESS OF INNOVATIVE SCREENING METHODS IN ELIMINATING HUMAN AFRICAN TRYPANOSOMIASIS: PILOT PROJECT (TRYPELIM) CONDUCTED IN TWO HEALTH DISTRICTS OF THE DEMOCRATIC REPUBLIC OF CONGO

Nganzobo Pathou;
National Sleeping Sickness Control Program, RCD

Objective:
Evaluate the relevance of active screening in villages neighbouring eligible villages.

Materials and methods:
Two health districts, Mosango and Yasa-Bonga in the DRC, were used to demonstrate the new approach to screening, using mobile mini team on motorbikes, based on the planning of villages that had not reported any cases in the last five years and located within 5 km of eligible villages, and electronic data capture. The data covered the period from May 2016 to December 2018.

Results and discussion:
A total of 439 villages were visited (166 in Mosango and 273 in Yasa-Bonga), 129 of which were eligibles and 310 ineligibles, including 72 villages visited in 2016, 180 in 2017 and 228 in 2018.

These ineligibles villages (according to WHO) but with cases represented 32% (n=37, N=115) of the villages visited with cases overall. This proves that the approach was relevant, as the people living in these villages share the same social habits and are therefore exposed to the same risk environment.

Conclusion:

Extending this approach to all endemic areas would be one of the most effective ways of eliminating sleeping sickness, as it would cover populations at the same risk.

2.13

SPATIAL MONITORING: A TARGETED AND INTEGRATED APPROACH TO ACCELERATE THE PROCESS OF ELIMINATING HAT IN THE REPUBLIC OF GUINEA

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Since 2012, vector control (LAV: lute anti-vectorielle) has been implemented in Guinea. In combination with medical control, this LAV has achieved the goal of eliminating Human African Trypanosomiasis (AHT) as a public health problem. To reinforce these gains, the national program put in place a targeted strategy tailored to the hypo-endemic context in order to accelerate the elimination process. This strategy consists of 4 steps. In the first step, screened patients are administered an extensive epidemiological questionnaire. In the second step, a spatialized follow-up is carried out around these patients in order to identify risk areas. In a third step, an entomological survey is undertaken in the locations thus identified. Finally, the fourth step is targeted reactive control, which is carried out through door-to-door screening and deployment of screens in identified areas. Between October 2022 and February 2023, 8 patients screened at Dubréka center were monitored. The activity sites identified were fishing, salting and rice-growing areas, with 3/9 not covered by the LAV. 74 tsetse were captured and 50 screens deployed. At the end of March 2023, a targeted door-to-door campaign involving 947 people in the camps and landing stations frequented by these patients identified 5 cases. These results show that the introduction of spatial monitoring has made it possible to identify hidden pockets within the control area. The effectiveness of this approach relies on a strong interaction between medical and entomological control.

Key words: HAT, targeted and integrated vector control, Geomatic system, Space of sharing at risk, Guinean Coastline

2.14

HAT IN THE DRC : CAN MATHEMATICAL MODELLING EXPLAIN INCREASING CASE REPORTING IN GRAND-KASAÏ FROM 2018 TO 2022?

Dr Shampa CHANSY, Dr Ron E CRUMP, Dr Julienne TSHOWA, Dr Christian M. ILENGE, Dr José DIMANDJA, Ching-I HUANG, E M MIAKA, Kat S ROCK

In the Democratic Republic of Congo (DRC) great progress has been made to reduce the burden of gambiense human African trypanosomiasis (gHAT) over the last two decades. Despite this, efforts to eliminate other infectious disease have shown us that moving from very low case reporting to zero is a huge challenge. This is exemplified by an uptick in recent case reporting in the "Grand Kasaï" region of DRC comprised of the provinces of Kasaï, Kasaï-Central, Kasaï-Oriental, Lomami, and Sankuru. Between 2009–2020 Grand Kasaï has reported reducing cases each year; recently they reduced from 203 in 2018 to 139 in 2020, however in 2022 there were 324 cases. We hypothesise that there could be various explanations including an increase in active screening coverage in 2021/22 following a dip during 2020 due to COVID-19, variable access to rapid diagnostic testing in recent years, or changes to underlying transmission trends. We use mathematical modelling to explore the cause of this increase by calibrating the model parameters to the longitudinal data for each health zone in Grand Kasaï from 2000–2020 to question whether the case reporting would have been expected given increased active screening and changes in passive detection. We discuss the results of this modelling analysis in the context of past progress and future plans for PNLTHA-DRC, including whether particular health zones in Grand Kasaï should be targeted for intensified or different interventions.

2.15

A COSTING AND COST-EFFECTIVENESS ANALYSIS OF SURVEILLANCE STRATEGIES FOR A SUSTAINABLE ELIMINATION OF HUMAN AFRICAN TRYPANOSOMIASIS IN CÔTE D'IVOIRE

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Côte d'Ivoire has made substantial progress towards elimination of gambiense HAT over the last couple of decades, from 188 cases in 2000 to an average of one case per year over the last 5 years, resulting in validation of elimination as a public health problem by the WHO in 2020. With very low prevalence, the national sleeping sickness elimination program (PNETHA) have moved away from large scale vertical interventions (including medical and vector control) towards more integrated surveillance strategies that can be implemented as part of the larger health system, but also towards reactive and targeted strategies. In this study, we produce a costing of various interventions implemented in Côte d'Ivoire, which we use to produce a cost-effectiveness analysis evaluating the comparative effectiveness and cost of multiple strategies. Costs are calculated with an ingredients-based bottom-up costing methodology based on actual prices paid by the PNETHA and partners. Evaluations of effectiveness are calculated using a compartmental mathematical model producing stochastic simulations under each strategy, and these are then combined with costs to produce cost-effectiveness outputs under a modified version of the net monetary benefit framework. Our results find that vertical interventions such as active screening are expensive and minimally effective and so are not cost-effective, but investing in a base level of surveillance remains vital to detect and avoid a large resurgence in disease.

2.16

COST-EFFECTIVENESS ANALYSIS OF TARGETED END-GAME INTERVENTIONS AGAINST GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS IN THE DEMOCRATIC REPUBLIC OF CONGO

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What is the epidemiological and economic feasibility of achieving elimination of transmission (EoT) of gambiense HAT in the Democratic Republic of Congo (DRC) by 2030? Using mathematical and health economic modelling, we assessed the comparative efficiency of six possible gHAT strategies in 166 health zones of the DRC. Alongside passive screening (PS), we simulated active screening (AS) at average and high coverage rates, both alone and in conjunction with vector control (VC) at different coverages. Outcomes were measured in disability-adjusted life-years (DALYs), the probability of EoT, and costs until 2040. Our analysis suggests that a third of health zones could meet EoT by 2030 (probability > 90%) under the strategy implementing average levels of AS (and continuing PS) and EoT could be epidemiologically feasible across the DRC but would require increased coverage of AS or VC in many endemic or hyperendemic areas. Whilst modeling suggests that VC strategies have the potential to be cost-saving and ensure EoT by 2030 in a selection of health zones, in most locations it is typically medical-only strategies (without VC) that are cost-effective at low cost-effectiveness thresholds ($0–500 per DALY averted) and unfortunately these strategies can have low probability of EoT by 2030. Although our analysis remains generally optimistic that gHAT elimination in the DRC may be epidemiologically and economically feasible with donor support, the biggest challenge is operationalizing intensified or new interventions in hard-to-access locations across this vast country.

2.17

FACTORS ASSOCIATED WITH ACTIVE THA SCREENING AT THE BIKORO RURAL HEALTH ZONE IN RDC.

GUYLAIN MANDULA

OBJECTIVE

THE AIM OF THIS STUDY WAS TO IDENTIFY FACTORS ASSOCIATED WITH COMMUNITY PARTICIPATION IN DA DE LA THA IN THE BIKORO ZSR.

METHODOLOGY: A CROSS-SECTIONAL ANALYTICAL STUDY WAS CARRIED OUT IN TWO HEALTH AREAS ENDEMIC TO THA IN THE BIKORO ZSR. A SAMPLE OF 400 PEOPLE RESIDING IN THESE HEALTH AREAS BETWEEN 2016 AND 2018 WAS SELECTED. MULTIPLE LOGISTIC REGRESSION ENABLED US TO IDENTIFY FACTORS ASSOCIATED WITH THA DA.

RESULTS AND DISCUSSION: 208/400 OR 52.00% (IC 95%47.00-57.00) REPORTED HAVING PARTICIPATED IN DA. THE MAJORITY, 75.5% (IC95%73,75-81,75), HAD A GOOD LEVEL OF KNOWLEDGE OF THA. A TOTAL OF 81% (IC 95% 77,25-84,51) OF RESPONDENTS HAD A FAVORABLE ATTITUDE TOWARDS DA. AFTER MULTIVARIATE ANALYSIS, PARTICIPATION IN ACTIVE SCREENING WAS SIGNIFICANTLY HIGHER AMONG RESPONDENTS PRACTICING THE CHRISTIAN RELIGION (P = 0.002), AMONG RESPONDENTS WHO ACKNOWLEDGED HAVING BEEN SENSITIZED (P = <0.001), AMONG RESPONDENTS WHO JUDGED THE START TIME OF ACTIVE SCREENING ACTIVITIES TO BE APPROPRIATE (P = 0.021) AND AMONG RESPONDENTS WHO JUDGED THE ANNOUNCEMENT OF RESULTS TO BE CONFIDENTIAL (P = 0.023).

CONCLUSION: PARTICIPATION IN DA IN THA REMAINS LOW DESPITE A GOOD LEVEL OF KNOWLEDGE OF THA, DA AND A FAVORABLE ATTITUDE TOWARDS DA. RAISING AWARENESS, ORGANIZING DA AT CONVENIENT TIMES AND ENSURING CONFIDENTIALITY IN THE REPORTING OF SCREENING RESULTS CAN IMPROVE PARTICIPATION IN DA.

2.18

BARRIERS TO THE INTEGRATION OF HAT EARLY CASE DETECTION ACTIVITIES INTO PRIMARY HEALTH CARE SERVICES IN BIBANGA, (DR CONGO)

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The main strategy for eliminating Human African Trypanosomiasis (HAT) is early case detection and effective treatment of patients. However, under-detection is observed during active screening due to the low prevalence of the disease. In this context, the main alternative envisaged is the integration of passive screening into first-level health services. However, this integration process comes up against several obstacles in the field. This study aims to identify the potential barriers likely to affect the integration of passive screening for HAT. The research was based on 13 focus groups and 12 semi-structured interviews conducted with community members, front-line healthcare providers in the Bibanga HZ and provincial decision-makers in May 2022. The results revealed that the integration of passive screening does not stand a chance in a non-functioning health system. Bottlenecks were highlighted in terms of the constraints that community members face in accessing care (financial and geographical accessibility) and the gaps that remain between the availability of services, the quality of care and the expectations of stakeholders. Our study has shown that in a context of low HAT prevalence, integration must be approached holistically, taking into account ownership, community involvement, resource mobilization, especially finance, public-private partnerships, good governance and universal health coverage.

2.19

WHOSE ELIMINATION? FRONTLINE WORKERS' PERSPECTIVES ON THE ELIMINATION OF THE HUMAN AFRICAN TRYPANOSOMIASIS AND ITS ANTICIPATED CONSEQUENCES

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While academic literature has paid careful attention to the technological efforts drugs, tests, and tools for vector control deployed to eliminate Gambiense Human African Trypanosomiasis (HAT), the human resources and health systems dimensions of elimination are less documented. This work analyses the perspectives and experiences of frontline nurses, technicians, and coordinators who work for the HAT program in the former province of Bandundu in the Democratic Republic of the Congo, at the epidemic's very heart. The research is based on 21 semi-structured interviews conducted with frontline workers in February 2018.

The results highlight distinctive HAT careers as well as social elevation through specialised work. Frontline workers are concerned about changes in active screening strategies and the continued existence of the vector, which lead them to question the possibility of imminent elimination. Managers seem to anticipate a post-HAT situation and prepare for the employment of their staff; most workers see their future relatively confidently, as re-allocated to non-vertical units.

The findings suggest concrete pathways for improving the effectiveness of elimination efforts: improving active screening through renewed engagements with local leaders, conceptualising horizontal integration in terms of human resources mobility, and investing more in detection and treatment activities (besides innovation).

2.20

STRENGTHENING IMPACT OF PASSIVE PROSPECTING COMBINED WITH DIRECTED REACTIVE PROSPECTING FOR THE ELIMINATION OF SLEEPING SICKNESS IN ANGOLA.

MAKANA Don Paul, Mbueno, KAYEMBE Simon, BESSELL Paul, Peliganga, Constantina MACHADO and NDUNG'U Joseph

Following the low prevalence rate,the strategy of intensive passive screening that was initiated in 2016, with the result of a good integration of the diagnosis and treatment of HAT in the health facilities which has improved the coverage of the population at risk in passive screening and the increase in the number of technicians in the fight against sleep disease.

Since 2021 we have improved this strategy by reactive active screening in the foci which notified serological suspects and newcases.

After analysis of data, we launched the mobile teams to carry out their activities in the villages which have notified serological suspects and new HAT cases in order to reduce the financial expenses that can be incurred during inconclusive itineraries.

We have analyzed data from the last three 2018, 2019 and 2020 to see which facilities have notified new cases and serological suspects will be visited by the mobile teams a priori.

Compared to the cumulative data we observed two provinces with a high incidence rate: Uige with 92 new cases and Cuanza Norte with 27 new cases.

During 2021, after the lifting of the measures against COVID 19, we started reactive active screeningin Cuanza Norte, the municipality of Banga had 21 cases during the three last years,only in2021 this municipality got 61 HAT cases out of 6108 people examined,in Bolongongo'municipality we got 49 cases out of 8526 people and in Quiculungo we had 25 HAT cases out of 8024 people examined,inBembe 19 cases in last 3 years,10770 people examined with 18 cases in 2022.

This strategy demonstrated that enhanced passive screening combined with the reactive active screening can ensure the HAT elimination, as well as reduce the cost for normal active screening. Passive screening, supplemented by directed mobile teams, overcomes some of the challenges of suspect referral. Reactive screening in villages where HAT cases have been reported appears to be very beneficial.

2.21

REPURPOSING THE MEDICINES FOR MALARIA VENTURE (MMV) COVID BOX LIBRARY IDENTIFIED THE ANTICANCER DRUG DELANZOMIB AS A FAST-ACTING ANTITRYPANOSOMAL AGENT.

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Objective: The emergence of resistant trypanosome strains to current chemotherapies against trypanosomiasis urges the identification of alternative drugs, preferably bearing novel modes of action to achieve the global WHO agenda to eradicate this stigmatizing and disabling disease. Drug repurposing is one of the fast-track approaches for the development of antiparasitic drugs. In this regard, the current work was designed to investigate the antitrypanosomal potential of the MMV COVID Box library. Materials and methods: Briefly, the MMV COVID BOX compounds were screened in vitro for their antitrypanosomal activity against Trypanosoma brucei brucei and for cytotoxicity on Vero cells using the resazurin-based cell viability assay. Active and selective compounds were submitted to time-kill kinetic and reversibility assays. Results: Out of the 160 compounds, the anticancer drugs Delanzomib (MMV690548) and Osimertinib (MMV690733) emerged with good antitrypanosomal activity (IC50 0.35 and 0.95 µM respectively) and high selectivity (SI>10). Delanzomib exhibited a fast and irreversible action within 8 hours, while Osimertinib portrayed a slow and reversible action against Trypanosoma brucei brucei. Discussion: The observed antitrypanosomal activities might be due to the inhibition of trypanosome's proteasome and tryrosine kinase (a therapeutic and vital target involved in cell cycle control in kinetoplastids) by delanzomib and osimertinib respectively. Conclusion: Delanzomib can be a starting point for the discovery of new drugs against African Typanosomiasis.

Keywords: COVID BOX, Delanzomib, Osimertinib, Anti-trypanosomal activity, Cytotoxicity, Time Kill.

2.22

NOVEL ANTITRYPANOSOMAL DIAMINOQUINAZOLINE ANALOGUES FROM REPURPOSING THE MEDICINES FOR MALARIA VENTURE OPEN ACCESS PATHOGEN BOX LIBRARY (MMVPBOX)

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Objective: African trypanosomiasis is a neglected tropical disease known to exert negative socio-economic impacts in affected developing countries. The drawbacks associated with the current therapies represent the main bottleneck of this disease control, highlighting the need to develop alternative treatments. The present work was designed to identify promising starting points for trypanosomiasis drug development from repurposing the MMVPBox library. Materials and methods: Compounds from the MMVPBox library were screened for their antitrypanosomal activity against Trypanosoma brucei brucei and cytotoxicity on Vero cells using the resazurin-based cell viability assay. Furthermore, a small library of analogues of one (MMV675968) of the identified hits was screened for antitrypanosomal, cytotoxicity and mode of action studies. Results: The Rudimentary SAR study led to the identification of two diaminoquinazoline analogues which displayed approximately 40-fold (MMV1578467) and 60-fold (MMV1578445) more potency and selectivity than the parent hit (MMV675968). MMV1578445 portrayed fast and irreversible trypanosome growth arrest while MMV1578467 exhibited slow-acting and reversible profile. Discussion: In silico and in vitro enzymatic assays showed that the observed antitrypanosomal activity might be due on the one hand to the ability of MMV1578467 and MMV1578445 to strongly inhibit trypanosome DHFR enzyme, an important therapeutic target and on the other hand to induce apoptosis through Trypanosoma brucei DNA fragmentation. Conclusion: The two potent analogues endowed with predicted suitable physico-chemical and ADMET properties are good candidates for further deciphering their potential as starting points for new drug development for African Trypanosomiasis.

Keywords: MMVPBox, Antitrypanosomal, diaminoquinazoline, SAR, mode of action, DHFR, DNA fragmentation

2.23

NOVEL TREATMENT FOR HUMAN AFRICAN TRYPANOSOMIASIS IN GUINEA: FEASIBILITY STUDY IN THREE SLEEPING SICKNESS FOCI (DUBRÉKA, FORÉCARIAH, BOFFA).

Camara Mariame Layba

Abstract:

Conventional treatments for Human African trypanosomiasis or sleeping sickness are challenging especially those of the second phase, both for medical personnel and for patients. Patients must undergo lumbar puncture to receive treatment because treatment depends on the stage of the disease, and treatment must be administered by qualified medical personnel who must remain at the patient's bedside throughout the duration of the treatment. In order to reduce this HAT management burden, an oral treatment that is effective in both phases of the disease has been developed. For example, a study has been commissioned to determine the feasibility of a new treatment for HAT in three endemic foci in Guinea. A descriptive cross-sectional analytical study using a mixed (quantitative and qualitative) approach was discussed. Questionnaires were administered to 422 people (patients and relatives treated for HAT between 2018 and 2020) in the three endemic coastal foci; then two focus groups were organized, one for patients treated with the conventional molecule and the other for patients treated with the new drug; finally three directed interviews were organized with agents involved in the treatment of sleeping sickness in the three foci.

The study found that although NECT is effective, oral treatment remains more popular both among staff and patients as it is considered as a major step towards eliminating the disease. However, patients emphasized that the treatment should be given on an outpatient basis under the supervision of a health worker.

2.24

ACCESS TO FEXINIDAZOLE, A NEW ORAL DRUG AGAINST T.B GAMBIENSE HAT IN THE CONTEXT OF THE COVID-19 PANDEMIC IN THE DRC: JANUARY 2020 TO DECEMBER 2021

Introduction

HAT, or sleeping sickness, is a disease that affects populations in the poorest regions of sub-Saharan Africa. Conventional treatments require intramuscular or intravenous administration, but a recently developed drug, fexinidazole, is administered orally. Fexinidazole was approved at the end of 2018 in the DRC to treat HAT caused by Trypanosoma brucei gambiense.

Methodology and materials

Training activities on the new WHO therapeutic guide were organized, including the use of fexinidazole, pharmacovigilance and monitoring of health personnel (doctors, nurses and lab technicians) in the health facilities of the 11 regional coordinations of the PNLTHA in the DRC.

Results

The PNLTHA, with support from DNDi, trained 480 health workers (March 2020 to September 2020) from 179 health facilities, of which 68 (37.9%) treated patients with fexinidazole; 8 of these treated an HAT case for the first time (11.8%). Between March 2020 and December 2021, 458 new cases of HAT were diagnosed after the start of Fexinidazole use in the DRC, of which 239 (52.2%) were treated with fexinidazole; 199/239 (83.3%) avoided diagnostic lumbar puncture and 89/239 (37.2%) were treated at home. The rate of follow-up visits for the cohort of patients treated in 2020 (95 patients including 3 deaths [3.2%]) up to 12 months was 90/95 (94.7%) at M6 and 81/95 (82.3%) at M12.

Conclusion

The COVID-19 pandemic led to restrictions (travel bans, no gatherings of people) in the management of other diseases; Fexinidazole administered under real-life conditions in our communities was well appreciated by healthcare staff and patients. Home treatment was very well accepted by patients. Follow-up is continuing for up to 24 months, in order to draw further conclusions about the efficacy and safety of these patients. Patients are coming for visits and their clinical progress is good.

2.25

PERSPECTIVES FOR THE INTRODUCTION OF FEXINIDAZOLE TO TREAT R-HAT: HAT-R-ACC PROJECT RESULTS.

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As part of efforts towards an arsenic-free oral treatment for human African trypanosomiasis (HAT) caused by Tb rhodesiense and a tool for disease elimination, a multi-centre, open-label clinical trial on efficacy and safety of fexinidazole in 45 patients with r-HAT was conducted in Malawi and Uganda. The trial was also the central point for a wider project intended to: increase diagnostic capacity by training and providing supplies; understand population knowledge of the disease and health-seeking behaviour through ethnographic research in the endemic regions where the trial was conducted; and promote disease awareness among the population through community information. The primary study objective was met: the rate of r-HAT- or treatment-related deaths at end of hospitalization in 34 evaluable patients with stage 2 r-HAT was 0% (90% CI 0.00, 8.43), lower than the predefined unacceptable rate of 8.5% (p=0.0488). Safety data was similar to the findings with g-HAT patients, with fewer reported adverse events. Clinical and laboratory staff from endemic regions of Malawi and Uganda were trained in HAT diagnosis and treatment. Two ethnographic studies were completed, leading to the update of communication materials and community awareness campaigns. The dossier to extend the indication of fexinidazole to r-HAT has been submitted to the EMA EU-m4all process for scientific opinion, with the goal of inclusion of fexinidazole for r-HAT in WHO guidelines and adoption by endemic countries of eastern and southern Africa in 2024.

2.26

EFFICACY AND SAFETY OF ACOZIBOROLE IN PATIENTS WITH HUMAN AFRICAN TRYPANOSOMIASIS CAUSED BY TRYPANOSOMA BRUCEI GAMBIENSE: A MULTICENTRE, OPEN-LABEL, SINGLE-ARM, PHASE 2/3 TRIAL

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Fexinidazole, the latest oral treatment recommended by WHO to treat human African trypanosomiasis (HAT), also requires systematic admission to hospital – problematic in areas with few health-care resources. We aimed to assess the efficacy safety and safety of acoziborole, a single-dose oral treatment in adult and adolescent patients with T.b. gambiense HAT (g-HAT). This multi-centre, prospective, open-label, single-arm, phase 2/3 study recruited patients aged 15 years or older with confirmed g-HAT infection in the DR Congo and Guinea. Oral acoziborole was administered as a single 960 mg dose (3 × 320 mg tablets) to fasted patients and observed in hospital after treatment administration and then for 18 months as outpatients with visits at 3, 6, 12, and 18 months. The primary efficacy endpoint was the success rate of acoziborole treatment at 18 months. Between October 2016 and March 2019, 260 patients were screened and 208 were enrolled (167 with late-stage and 41 with early or intermediate-stage g-HAT; primary efficacy analysis set). Treatment success rate at 18 months was 95 ·2% (95% CI 91 ·2–97 ·7) in patients with late-stage g-HAT, similar to the estimated historical success rate for NECT of 94% and 100% in early or intermediate stage g-HAT patients. Overall, 155 (75%) of 208 patients had 600 treatment-emergent adverse events. 29 (14%) patients had 38 drug-related

treatment-emergent adverse events; all were mild or moderate. Given the high efficacy and favorable safety profile, acoziborole holds promise in the efforts to reach the WHO goal of interrupting HAT transmission by 2030.

2.27

DNA VACCINE ENCODING TRYPANOSOMA BRUCEI MAJOR SURFACE PROTEASE-B INDUCED IGG RESPONSE AND CONFERRED PARTIAL PROTECTION IN IMMUNIZED BALB/C MICE

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Abstract

Trypanosoma brucei major surface protease-B is a surface-localized enzyme that catalyzes proteolytic removal of old variant surface glycoprotein (VSG) for expression of new one, an important stage-specific function that allows the parasite to survive in its host, thus making it an attractive candidate for vaccine development. Herein, the potential of Trypanosoma brucei MSP-B as a DNA-based vaccine was evaluated in BALB/c mice. Tbmsp-b gene was cloned into a modified pVAX-1 plasmid to produce pVAX-1-Tbmsp-b construct for DNA vaccine trials. Mice were vaccinated by intradermal injection with 100 µg dose of the vaccine thrice on days 0, 21 and 42, then challenged with 2000 parasites at day 56. Anti-trypanosoma specific antibody (IgG) and cytokine (□-IFN) were monitored by enzyme-linked immunosorbent assay (ELISA) from sera of vaccinated and unvaccinated mice. Vaccinated mice showed significantly higher ($p < 0.05$) IgG response and had lower parasitaemia (by 75% and 51.2% of parasitaemic scores on first and fifth week of infection) and longevity by up to 22 days compared to unvaccinated mice. The results revealed that the pVAX-

1-Tbmsp-b DNA vaccine construct provided partial protection to virulent T. b. brucei (Federe strain) infection in susceptible BALB/c mice suggesting the potentials for using MSP-B as an antigen in DNA vaccine development against African trypanosomiasis. MSP-B induced humoral response by enhancing immunoglobulin levels and conferred partial protection by increasing longevity and reduced parasitaemia in experimentally infected mice.

Key words: Trypanosoma brucei brucei, Major Surface Protease-B, DNA Vaccine, Vaccination, Immune response.

HAT ANIMAL RESERVOIR AND VECTOR CONTROL IN HAT ELIMINATION

2.28

TRACKING THE ANIMAL RESERVOIR OF T.B. GAMBIENSE: REACTIVE VETERINARY SCREENING IN MAYILI

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INRB : Dieudonne Mumba Ngoyi, Oliver Fataki, Bobo Lutandila, Enock Mavanga & Pati Patient Pyana
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Abstract:

Gambiense human African trypanosomiasis (gHAT) is traditionally viewed as a disease transmitted solely among humans. However, sporadic detection of Trypanosoma brucei gambiense in domestic animals necessitates further investigations, especially as we approach gHAT eradication.

In July 2022, an alert about potential gHAT cases in the remote village of Mayili, DRC, prompted a 'reactive' screening from a joint team from ITM, PNLTHA, and INRB. The team aimed to screen both human and animal populations within the village. We identified 14 HAT seropositive individuals, confirming one case through mAECT buffy coat, which was frozen as cryostabilate for rodent inoculation. Venous blood was preserved in nucleic acid stabilization buffers from all HAT suspects and 19 endemic controls. We sampled all domestic animals in the village, including 13 pigs, 35 goats, 12 sheep, 12 dogs, and 24 bovines and detected trypanosomes in one pig and one bovine using a modified mAECT-BC protocol for animal blood.

Molecular testing supported the mAECT-BC result for the patient, with all other seropositives and endemic controls testing negative for T.b. gambiense. Interestingly, while no Trypanozoon nucleic acids were detected in animals, we found T. congolense and T. vivax in several of them. Rodent strain isolation proved unsuccessful, pointing to potential difficulties in field strain preservation or adaptation barriers.

Despite not finding T.b. gambiense in the domestic animals sampled, the presence of other animal African trypanosomes suggests high exposure to tsetse flies among all inhabitants, underscoring an urgent call for vector control in the village. These results highlight a role for reactive veterinary screenings in not only potentially identifying disease presence but also pinpointing critical areas for targeted vector control interventions.

2.29

STUDY OF ANIMAL RESERVOIR OF TRYPANOSOMA BRUCEI GAMBIENSE FOR A SUSTAINABLE ELIMINATION OF HUMAN AFRICAN TRYPANOSOMIASIS IN CÔTE D'IVOIRE

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Abstract

Côte d'Ivoire has undertaken to verify the interruption of human African trypanosomiasis (HAT) transmission in 2025. The existence of an animal reservoir of Trypanosoma brucei gambiense may compromise the achievement of this aim. Here, we describe an investigation carried out in the pigs of HAT historical focus of Vavoua where cases were still diagnosed in the early 2010's.

Pigs were tested for serology, parasitology and PCR according two different rearing models (free-ranging and pen). Laboratory mice were inoculated with blood by parasitology positive pigs to isolate trypanosome strains.

Free-ranging pigs appeared significantly more infected than pigs in pen. Over 70% of free-ranging pigs were positive for CATT and parasitological investigations. They were particularly infected by T. brucei s.l. (57%) and T. congolense (24%). Trypanolysis was positive in pigs with 27% of LiTat 1.3 variant described specific for T. b. gambiense. T. b. gambiense was also identified by PCR on 6 isolated strains.

This study shows that pigs are strongly infected by trypanosomes, particularly T. brucei s.l. in the Vavoua focus, which is consistent to previous results obtained in other endemic foci in Côte d'Ivoire.

Our results suggest that pigs are potential reservoirs of T. b. gambiense, but doubts remain on the sensitivity and specificity of the tools used. It is important to develop more effective tools to improve our knowledge of the epidemiological role of the potential animal reservoir of T. b. gambiense, and to be able to implement appropriate strategies for the sustainable elimination of HAT in Côte d'Ivoire.

Keywords : Human African trypanosomiasis ; Trypanosoma brucei gambiense ; Animal reservoir ; Sustainable elimination ; Côte d'Ivoire

2.30

HUMAN AFRICA TRYPANOSOMIASIS IN LITTORAL REGION OF CAMEROON : AN UPDATED WITH FIRST EVIDENCE ON THE CIRCULATION OF TRYPANOSOMA BRUCEI GAMBIENSE IN MANOKA ISLAND

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A survey on Human African Trypanosomiasis (HAT) is essential for prevention and preparedness for epidemics. The objective of this study is to assess the circulation of human trypanosomes and their vectors across quiescent HAT foci of the Littoral Region of Cameroon. A descriptive study on the presence of Trypanosoma brucei gambiense and its potential vectors was carried out in Youpwe, Yabassi, Sodiko, Manoka island and Cape-Cameroon Island from February to April 2022. Tsetse flies collected from the five selected locations using pyramidal traps, were first classified by species according to their morphology, then by sub-species with Polymerase Chain Reaction Diagnostic (PCR-Diag). Trypanosoma species and sub-species were subsequently identified and genotyped using a Nested PCR. Glossina palpalis palpalis was the unique tsetse subspecies recorded across the five locations. The tsetse infection rate by Trypanosoma ssp. varied between 5.35% in Cape-island and 35.71% in Manoka island. Three Trypanosoma species were detected: T. brucei s.l. 32/500 (6.4%), T. congolense 15/500 (3.0%), and T. vivax 8/500 (1.6%). The sub-species T. b. gambiense responsible for HAT was detected in tsetse flies from Manoka (2/150 : 1.33%), whereas T. congolense consisted of T. congolense "forest" and T. congolense "savannah" types. The presence of T. b. gambiense and T. congolense sub-species in Manoka and nearby suggests residual circulation of human and animal trypanosomes in quiescent HAT foci of the littoral region of Cameroon.
Keywords : Human African Trypanosomiasis, Trypanosoma brucei gambiense, Trypanosoma congolense, Glossina Palpalis Palpalis, Littoral Region, Cameroon.

2.31

THE ROLE OF VECTOR CONTROL IN THE ELIMINATION OF HUMAN AFRICAN TRYPANOSOMIASIS IN CÔTE D'IVOIRE

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By 2020, Côte d'Ivoire had reached the goal of eliminating human African trypanosomiasis (HAT) as a public health problem. This achievement is the result of an integrated approach in which vector control was a key component. Indeed, in parallel with cases detection and treatment activities, vector control was implemented in the two endemic foci which are Bonon and Sinfra. This involved the deployment of insecticide-impregnated screens and traps. As a result, tsetse fly density dropped by over 90% as soon as vector control was implemented in 2016 in Bonon and 2017 in Sinfra. This also led to the disappearance of tsetse flies in the urban areas where historically most cases of HAT originated. Thus, only 4 cases of HAT were detected in Bonon and 2 in Sinfra from 2016 to 2020, whereas between 2000 and 2015, 325 and 177 cases were reported in these two foci. The prevalence of trypanosomes in cattle and pigs, which are the potential reservoirs of Trypanosoma brucei gambiense has been also significantly reduced. These results demonstrated that vector control has largely contribute to reduce the incidence of HAT in Côte d'Ivoire. However, a risk of re-invasion from residual tsetse populations in the study area or from those living outside the control zone has been highlighted. It will be essential to take this into account if we are to reach the next milestone, which is the elimination of disease transmission by 2025.

Keywords: Human African trypanosomiasis, tsetse flies, vector control, Côte d'Ivoire.

2.32

IMPACT OF TWO YEARS OF VECTOR CONTROL ON TRYPANOSOME TRANSMISSION IN ANIMALS FROM THE CAMPO HAT FOCUS IN CAMEROON

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Human African trypanosomiasis (HAT) has been targeted by the World Health Organization as a disease where interruption of transmission can be achieved by 2030. To achieve this goal, vector control using "Tiny Targets" has been implemented in the Campo human African trypanosomiasis focus in Cameroon since 2020 in order to reduce contact between humans, tsetse flies and animals. This study was carried out to determine trypanosome infection rates in animals after two years of vector control. For this, blood samples were collected from domestic animals in October 2019 and March 2022. Serological tests such as card agglutination test for trypanosomiasis (CATT) and molecular tests were used to assess the infection rate to trypanosomes. Of the 101 animal samples collected in 2019, 39.6% (40/101) were CATT positive and 47.5% (48/101) were molecular test positive. These animals were more infected with Trypanozoon subgenus trypanosomes (22.8%) and less infected with Trypanosoma congolense savannah (3.9%). In 2022, 131 animals were sampled, 29.8% (39/131) were CATT positive and 28.2% (37/131) were molecularly positive. These animals were also more infected with Trypanozoon subgenus trypanosomes (23.7%) and less infected with Trypanosoma congolense savannah (0.8%). No Trypanosoma vivax infections were recorded after vector control. Animals were significantly ($X2=9.13$; $P=0.003$) less infected after than before vector control. This study confirms the circulation of animal trypanosomes in the Campo focus. The significant reduction in infection rates after two years vector control highlight the need to continue vector control and even extend it to other foci for African trypanosomiasis elimination.

Keywords: Human African trypanosomiasis, vector control, African trypanosomiasis, Campo

2.33

DECIPHERING RESISTANCE OF GROUP 2 TRYPANOSOMA BRUCEI GAMBIENSE TO LYTIC FACTORS IN HUMAN SERUM

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Considered as a zoonotic agent of human African trypanosomiasis (HAT), group 2 of T. b. gambiense (Tbg) has been forgotten for far too long. Improving our understanding of the behaviour of these atypical strains will also contribute to the WHO goal of eliminating HAT transmission by 2030. Therefore, in this proposal, we will investigate the factors that influence the establishment of these parasites in the human host. We will focus primarily on the mechanisms that allow Human Serum Resistance (HSR) in these strains. These mechanisms are different from those observed in other infective human trypanosomes. Indeed, they do not possess Serum Resistance Associated protein (SRA) responsible for HSR in T. b. rhodesiense or the Tbg-specific glycoprotein (TgsGP) responsible for HSR in Tbg. Based on preliminary data, we observe variable resistance of these strains to human serum. We will apply a transciptomic approach to find the key factors involved in these variable resistances and a Crispr Cas9 approach to study the mechanics of these factors. Overall, we hope to have a better overview

2.34

CONTRIBUTION OF FIXED HEALTH FACILITIES IN THE ELIMINATION OF HAT

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Introduction

The most effective way to control Human African Trypanosomiasis (HAT) since the time of Jamot was the use of mobile teams.

These are expensive compared to fixed health facilities. Almost all the technical and financial partners wish to support them. Therefore, we want to evaluate their contribution in the elimination of HAT.

Goals

Our objective is to determine the contribution of fixed health structures in the objective of eliminating HAT and to propose a paradigm that can reduce the cost.

Methodology

We carried out the documentary review technique by consulting the annual reports for ten years (from 2010 to 2019) of the mobile units of the HAT Provincial Coordination of Kasai Oriental.

Our sampling is exhaustive and concerns health facilities.

Result

Mobile teams examine more people than fixed health facilities ;

Fixed structures generally diagnose more patients than mobile teams,

The proportion of patients diagnosed at the haemolymphatic stage, the phase of active transmission of HAT by mobile teams, is higher than those in fixed health structures. This corroborates the thesis of, F.Mbo: Towards a strengthening of passive screening and its contribution to the fight against human African

trypanosomiasis which had demonstrated that more than 70% of cases detected passively each year from 2001 to 2005 were in the advanced or neurological stage of sleeping sickness.

In conclusion, mobile teams remain the appropriate tool for the elimination of HAT

2.35

EXTENSION OF SENTINEL SITES IN ENDEMIC AREAS IN DRC FOR THE TE-TSHE-TSHE CONTROL.

REFERING TO THE RESULTATS OF ACTIVITIES IN THE SENTINEL SITES FROM 2015 TO 2022 USING RDT AS FOR THE PASSIVE DIAGNOSTIC IN EQUATEUR NORD/RD CONGO

N°	INDICATEUR/ANNEE	2015	2016	2017	2018	2019	2020	2021	2022	TOTAL
1	TDR REALISE	593	2672	2981	3745	2517	3369	3425	4863	**24165**
2	TDR+	15	51	47	62	54	72	59	74	**434**
3	PORPORTION TDR +	2,5	1,9	1,6	1,7	2,1	2,1	1,7	1,5	**1,8**
4	NC SITES SENTINELLES	3	4	7	5	9	6	12	10	**56**
5	TOTAL NC COORDINATION	29	36	23	18	21	14	37	17	**195**
6	% NC SITES SENT	10,3	11,1	30,4	27,8	42,9	42,9	32,4	58,8	**28,7**

SOME DIFFICULTIES:

1. Lack of equipment for diagnostic in the sentinel sites ;
2. Lack of energy for the diagnostic ;
3. Lower covering sentinel sites among endemic areas almost in in the Karawa and Gbadolite areas

SOME SOLUTION SUGGESTED

1. Supply the energy and some equipment to the sentinel sites ;
2. Increases the number of those sentinel sites for a large covering of the all endemic areas.

2.36

EFFECTIVENESS OF ACTIVE SURVEILLANCE AND VECTOR TSE-TSE CONTROL: A 4-YEAR EVALUATION REPORT OF THE NATIONAL HUMAN AFRICAN TRYPANOSOMIASIS CONTROL PROGRAM IN CAMEROON, 2018-2021.

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Abstract

The WHO 2012-2020 roadmap for neglected tropical diseases included the elimination of Human African Trypanosomiasis (HAT) as a public health problem by 2020. In Cameroon, the National HAT Control Program (NHATCP) prioritized activities to achieve this goal. We evaluated the effectiveness of the NHATCP as this roadmap came to an end. We conducted a cross-sectional study in August 2022. The evaluation was participatory and focused on the NHATCP effectiveness from January 2018 to December 2021. We assessed case detection (active and passive surveillance), case management, vector control (infected tse-tse density in "Tiny targets"), and the ratio activities realized/planned following the National Strategic Plan. We interviewed key program actors at central, regional, and peripheral levels in three active foci using a structured questionnaire. We analyzed data using Microsoft Excel 2016. We interviewed 20 (100%) actors from all levels. Forty HAT confirmed cases were detected: 33 (82.5%) by active surveillance and 7 (17,5%) by passive surveillance. Among them, 25 (62.5%) were diagnosed in the early stage (stage 1) and 15 (37.5%) in stage 2. Thirty-nine (97.5%) cases were completely treated, one refused. Vector tse-tse density decreased from 16.8% (177/1054) to 2.1% (17/826) in 4 years. The population coverage was 18,069 (50.2%) for 9/13 (69.2%) screening-treatment campaigns and 7/12 (58.3%) supportive supervisions carried out. Active surveillance, case

management and vector control were optimal while passive surveillance and supportive supervisions ratio remained weak. Additional financial and material resources might improve the achievement of the elimination of HAT as a public health problem in Cameroon.

Keywords: Evaluation, Effectiveness, HAT Control Program, Cameroon.

2.37

CONNAISSANCES, PERCEPTIONS, ATTITUDES ET PRATIQUES DES COMMUNAUTES DE LA ZONE DE SANTE DE BANDUNDU SUR LA TRYPANOSOMIASE HUMAINE AFRICAINE EN FEVRIER 2021

HELENE MAHENZI, MONITEUR CLINIQUE

OBJECTIF : DETERMINER LE NIVEAU DES CONNAISSANCES, PERCEPTIONS, ATTITUDES ET PRATIQUES DE LA COMMUNAUTE DE LA ZONE DE SANTE DE BANDUNDU SUR LA THA POUR AMELIORER LA PARTICIPATION AU DEPISTAGE ACTIF AFIN D'ESPERER A L'ELIMINATION DE LA MALADIE.

METHODES : NOUS AVONS REALISE UNE ETUDE TRANSVERSALE DESCRIPTIVE AVEC DES ENTRETIENS STRUCTURES A L'AIDE D'UN QUESTIONNAIRE CHEZ 419 CHEFS DES MENAGES SELECTIONNES PAR ECHANTILLONNAGE PROBABILISTE A TROIS DEGRES DANS TROIS AIRES DE SANTE ENDEMIQUES DE LA ZS DE BANDUNDU EN RDC.

RESULTATS : SUR LES 419 REPONDANTS, 379 SOIT 90,5% AVAIENT DEJA ENTENDU PARLER DE LA THA ET 85, 2% AVAIENT DEJA PARTICIPE AU DEPISTAGE ACTIF. TRENTE-SIX SOIT 8,6% DES REPONDANTS ETAIENT DES ANCIENS MALADES THA, 75% PARMI EUX ETAIENT DIAGNOSTIQUES AU STADE AVANCE DE LA MALADIE. EN OUTRE, PLUS DE SIX REPONDANTS SUR DIX (67%) AVAIENT UN FAIBLE NIVEAU DES CONNAISSANCES DE LA THA, 28% DES REPONDANTS AVAIENT DE MAUVAISES PERCEPTIONS DE LA THA, 42% AVAIENT DES ATTITUDES DEFAVORABLES FACE A LA THA ET 63% DES REPONDANTS AVAIENT DES PRATIQUES NON OPTIMALES FACE A LA THA.

CONCLUSION : L'ETUDE A MONTRE QU'IL Y A UN FAIBLE NIVEAU DE CONNAISSANCES SUR LA THA ET DES PRATIQUES NON OPTIMALES FACE A LA THA. AINSI, IL EST IMPORTANT D'INTENSIFIER LA SENSIBILISATION DE LA COMMUNAUTE.

MOTS CLES : CONNAISSANCES, PERCEPTIONS, ATTITUDES, PRATIQUES, THA, ZONE DE SANTE DE BANDUNDU, RDC

2.38

ARE THERE STILL GAMBIENSE-HAT CASES IN DINGILA? RESULTS OF HAT SCREENING IN DINGILA (BAS UÉLÉ PROVINCE, DRC) SIX YEARS AFTER ALL SCREENING ACTIVITIES HAD CEASED

Anja De Weggheleire, Paul Verlé, Philippe Büscher, Nick Van Reet, Dieudonné Mumba Ngoyi, Erick Mwamba Miaka, Epco Hasker

Ganga-Dingila health zone, Bas-Uélé province, DRC reported gambiense-HAT (gHAT) cases until 2015, whereafter screening activities were stopped. In 2021 we sought to explore gHAT prevalence in this area to assess the need for additional control activities as we aim to move towards elimination of gHAT transmission.

Health areas and villages with the highest prevalence in 2013/2014 were selected for an exploratory survey. The national sleeping sickness program (PNTLHA) organised active and passive screening and collected blood samples stored on DNA/RNA Shield and dried blood spots (DBS) for further molecular and serological analysis.

Between 2 and 14 December 2021, 2364 persons attended active screening in 18 villages. Thirty-two (1.35%) persons were positive in the Rapid Diagnostic Test (RDT), but none was parasitologically confirmed. Seroprevalence in the screened villages ranged from 0 to 2.9%. Sixty-six persons participated in passive screening in the health centre CSR Bambesa. Six were positive in the RDT, but none was parasitologically confirmed. All samples collected from the RDT positive participants were negative in qPCR. One sample was positive in immune trypanolysis (TL). This sample belonged to a 10 years old girl and fexinidazole treatment will be provided in July.

Even though active and passive screening did not reveal a gHAT case in the former gHAT focus of Ganga-Dingila, the TL showed that one person had contact with Trypanosoma brucei gambiense. As we progress towards elimination of gHAT transmission, not only finding these last cases but also treating them with a safe drug will be crucial.

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SYNTHESIS AND EVALUATION OF BENZIMIDAZOLE HYBRIDS AS ANTITRYPANOSOMAL AGENTS

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Human African trypanosomiasis is a parasitic disease caused by kinetoplastid protozoan of the genus Trypanosoma. Current treatments are decades old and suffer from serious limitations. There is an urgent need to develop new drugs that are safer and more effective. The present study was aimed at using the concept of molecular hybridization to synthesize hybrid compounds in which we conjugated the Benzimidazole nucleus with other heterocyclic compounds with antitrypanosomal activity to give new molecules acting by two distinct mechanisms. The compounds were synthesized using simple chemical reactions and subsequently purified using chromatography. Their structures were confirmed using spectroscopic methods. The trypanocidal activities of the hybrids were evaluated in-vitro against a sensitive strain of Trypanosoma brucei brucei. Results of the antitrypanosomal assay were analysed using a sigmoid concentration-response curve to determine IC50 for the compounds. Analysis of Variance (ANOVA) followed by a Tukey's post hoc test was used to determine statistical significance at $p < 0.05$. The compounds were successfully synthesized in good yield between 62 to 79 %. Their structures were confirmed by the spectroscopic data. All the compounds showed in vitro activity with IC50 values ranging between 45.16 ± 0.76 µg/mL and 144.00 ± 0.62 µg/mL. However, they were all less active as compared to the standard drug Diminazine aceturate which had IC50 of 23.99 ± 0.29. The hybrids were found to possess moderate antitrypanosomal activity and could serve as lead compounds that can be further developed in the search

2.40

POSTER: CAPACITY STRENGTHENING FOR ACCESS TO NEW ORAL HAT TREATMENT FEXINIDAZOLE THROUGH THE HAT PLATFORM

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3. Olaf Valverde, Geneva, Drugs for Neglected Diseases initiative, Switzerland

The HAT Platform, comprising members from more than 20 institutions, supports healthcare worker capacity strengthening in HAT-endemic countries to advance access to fexinidazole, a new oral HAT drug first approved in late 2018. HAT Platform support focuses on healthcare worker training in: WHO HAT treatment guidelines and national treatment guidelines in 10 endemic countries; and national pharmacovigilance (PV) systems in the five most endemic countries (Angola, Central African Republic (CAR), Democratic Republic of Congo (DRC), Guinea, and South Sudan), including set-up of five national PV units and six regional PV units in DRC. Since the approval of fexinidazole through the end of 2022, 630 healthcare workers from 243 health facilities have been trained on new WHO HAT interim treatment guidelines, and 556 HAT patients have been treated with fexinidazole with drugs supplied by WHO. Notifications of fexinidazole adverse events are sent to the WHO and national PV systems of targeted endemic countries. Four national PV systems have now been trained (Angola, CAR, Guinea, and South Sudan) and six regional sites of the DRC national PV system set up. In DRC, PV notification has been extended to other drugs through this project. Fexinidazole access through multi-donor funding has provided an opportunity to boost treatment with a highly effective new oral HAT drug in all ten endemic countries and develop the PV systems of five of them.

2.41

THE ROLE OF NANOMEDICINE IN IMPROVING DRUG DELIVERY: COMPARATIVE IN VITRO TRANSPORTATION OF PENTAMIDINE ACROSS THE BLOOD-BRAIN BARRIER USING NANOCARRIERS.

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Introduction

The brain is considered highly protected and regulated organ of the living body. Blood brain barrier (BBB) is its most selective barrier which make the brain inaccessible to most therapeutics agents intended for treatment of neurological ailments 1. Thus properly engineered drug delivery systems are key in order to overcome the challenge drugs encounter as they strive to cross this biological barrier. Recent advances in nanotechnology and its applications that enable drugs to preserve their efficacy while being delivered to precise therapeutic targets has created significant avenues in the development of drug delivery systems across the BBB 2. In this research, we reformulated pentamidine, a drug used to treat Human African Trypanosomiasis (HAT) in nanocarriers with aim of enhancing its transportation across the blood brain barrier (BBB).

Materials and Methods

Pentamidine was loaded in polycaprolactone nanoparticles (PCL NPs) using double emulsion solvent evaporation method and in phosphatidylcholine liposomes (PC Liposomes) using thin film hydration extrusion technique. These nanocarriers' size, size distribution or polydispersity index (PDI) and surface charge were determined using Dynamic Light Scattering techniques by Malvern zetasizer NanoZS90, Morphology was analyzed using Scanning Electron Microscope(SEM) and pentamidine drug loading in nanocarriers were determined using High Performance Liquid Chromatography (HPLC). Cytotoxicity was tested against the immortalized mouse brain endothelioma cells over 96 h. Cells monolayer integrity and nanocarriers transportation ability were examined for 24 h.

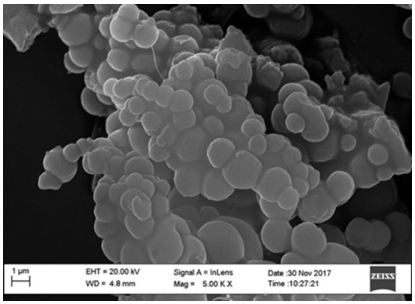
Results

- Pentamidine-loaded polycaprolactone (PCL) nanoparticles and liposomes size, PDI, surface charge and drug loading are given in the table below.

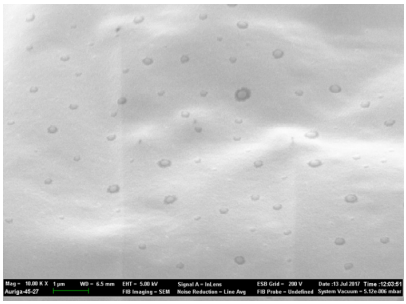
Table showing average size, PDI, surface charge and drug loading of nanocarriers

Nanocarrier	Size (Mean ± SE) nm	Size distribution (PDI)	Surface charge (mV)	Loading (µg/ mg)
PCL - NPs	267.58 ± 65.63	0.25 ± 0.15	-33.4 ± 8.12	0.16
PC Liposomes	119.61 ± 14.31	0.25 ± 0.02	11.78 ± 10.15	0.17

- Particles morphology as revealed using SEM



(a) Electron micrograph of PCL nanoparticles

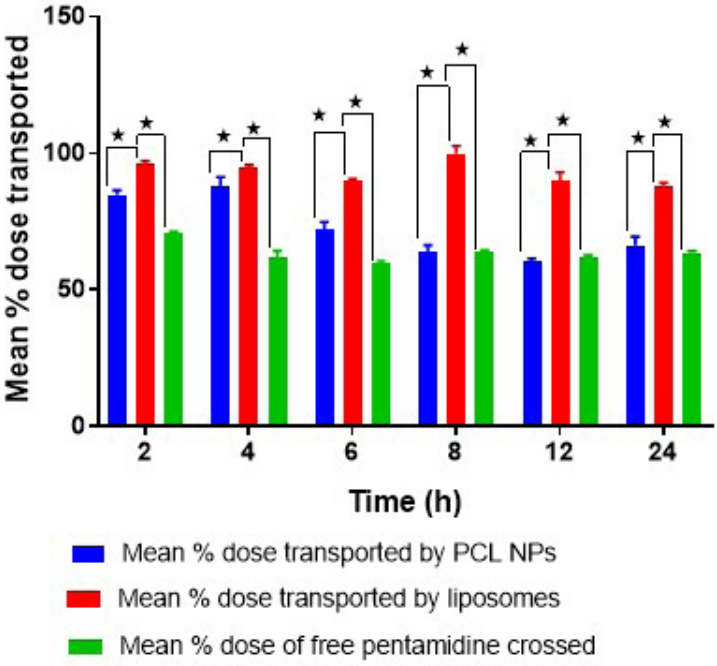


(b) Electron micrograph of Liposomes

- Toxicology effect of nanocarriers

PCL nanocarriers at doses higher than 5 mg/ml and liposomes at doses higher than 2.5 mg/ml exhibited cytotoxicity when exposed to cells

- Transportation capability of nanocarriers as shown in the figure below where liposomes transported higher dose of drug across the barrier as compared to PCL NPs and free drug.



Discussion and Conclusion

Methods used, successfully synthesized and loaded drugs in nanocarriers with appropriate characteristics 3. Higher concentrations of polycaprolactone and liposomes though have shown cytotoxic effect in cells in vitro but that does not guarantee the same in vivo. The transportation capability that liposomes have shown in transporting pentamidine better than movement of free drug across the BBB deems the carrier promising for further studies in vivo.

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2.42

ETHYL PYRUVATE AND HIV-1 PROTEASE INHIBITORS AS PROMISING AGENTS AGAINST HUMAN AFRICAN TRYPANOSOMIASIS

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Abstract

Background: Human African Trypanosomiasis (HAT) is a vector borne infectious disease of humans caused by an extracellular protozoan parasite. The disease, if left untreated, results in 100% mortality. However, the available drugs are full of severe drawbacks. Due to the probable similarity in cell metabolism among tumor and trypanosoma cells, some of the current registered drugs against HAT were derived from cancer chemotherapeutic research. On the other hand, initial studies have also demonstrated the efficacy of protease inhibitors in the treatment of Trypanosoma cruzi, Plasmodium falciparum and Leishmania major. Similar studies were, however, remain untouched on HIV-1 protease inhibitors against Trypanosoma brucei.

Methodology: Efficacy and corresponding target evaluation of ethyl pyruvate and HIV-1 protease inhibitors (ritonavir and saquinavir) on T. brucei (TC221) cell lines using a combination of biochemical techniques including cell proliferation assays, enzyme kinetics, zymography and phase contrast microscopic video imaging.

Results: Ethyl pyruvate has effectively killed the T. brucei cells within three hours post exposure which might probably be because of the net ATP depletion through inhibition of T. brucei pyruvate kinase enzyme (Ki=3.0±0.29 mM). On the other hand, HIV- Protease inhibitors also effectively inhibited proliferation of these cells. The drugs Saquinavir (SQV) and Ritonavir (RTV) showed their efficacy at IC50 of 11.49 μM and 12.23 μM concentration, respectively. The major proteases identified in T. brucei cells were the cysteine proteases (~29kDa Mr) and metalloproteases (~66kDa Mr). Their proteolytic activity was however not hampered by either of the aforementioned HIV-1 protease inhibitors.

Conclusion and Recommendation: Ethyl pyruvate is a safe and fast acting prodrug and because of its predefined property to easily cross the BBB, it can probably be a new candidate agent to treat the heamolymphatic and neurological stages of Human African Sleeping sickness. Similarly, HIV-1 Protease inhibitors, SQV and RTV, exhibited their anti-trypanosomal potential. However, further analysis to identify their specific target is required.

Keywords: T. brucei, Ethyl Pyruvate (EP), HIV-1 Protease Inhibitors, Pyruvate kinase, Human African Trypanosomiasis, Ritonavir, Saquinavir.

AFRICAN ANIMAL TRYPANOSOMIASIS (AAT)

EPIDEMIOLOGY

3.01

PREVALENCE AND RISK FACTORS FOR TRYPANOSOME INFECTION IN CATTLE FROM COMMUNITIES SURROUNDING THE MURCHISON FALLS NATIONAL PARK, UGANDA

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Bovine trypanosomosis transmitted by tsetse flies is a major constraint to cattle health and productivity in all sub-Saharan countries, including Uganda. The objectives of this study were to determine the prevalence of bovine trypanosomosis and identify its associated risk factors and the species of trypanosomes associated with the disease.

A cross-sectional study was conducted around Murchison Falls National Park, Uganda from January 2020 to April 2020. Trypanosomes were detected in blood samples by PCR analysis targeting the internal transcribed spacer 1 (ITS-PCR assays), and trypanosomes in positive blood samples were sequenced.

Of 460 blood samples collected and tested, 136 (29.6%) were positive for trypanosome infections and 324 (70.4%) were negative. The overall trypanosome prevalence was 29.6% (95% confidence interval 25.4–33.8%), attributed to three trypanosome species. Of these three species, Trypanosoma vivax was the most prevalent (n = 130, 28.3%) while the others were detected as mixed infections: T. vivax + Trypanosoma congolense (n = 2, 0.4%) and T.vivax + Trypanosoma evansi (n = 1, 0.2%). There were significant differences in trypanosome prevalence according to sex ($\square 2 = 62$, df = 1, $P < 0.05$), age ($\square 2 = 6.28$, df = 2, $P = 0.0043$) and cattle breed ($\square 2 = 10.61$, df = 1, $P = 0.001$).

Trypanosomosis remains a major limitation to cattle production around Murchison Falls National Park and interventions are urgently needed. In our study, the prevalence of trypanosome infections was high, with T. vivax identified as the most prevalent species. Age, sex and breed of cattle were risk factors for trypanosome infection.

3.02

PREVALENCE OF BOVINE TRYPANOSOMOSIS, APPARENT VECTOR DENSITY AND ASSOCIATED RISK FACTORS IN DEMBECHA AND DEBRE-ELIAS DISTRICTS OF AMHARA REGION, ETHIOPIA.

Sisay Alemu Mamo

ABSTRACT

A cross-sectional study was carried out in Dembecha and Debre Elias districts of Amhara Region, Ethiopia from October 2019 to June 2020 to determine prevalence of bovine trypanosomosis, its associated risks factors and to estimate the density and diversity of vectors. A total of 1016 bovine blood samples were collected randomly and examined using buffy coat technique, thin smear under Giemsa stain and hematologic procedure (measuring packed cell volume using hematocrit reader). In addition, questionnaire survey was conducted to assess the farmer perception on bovine trypanosomosis through 100 interviewed farmers. Descriptive statistics, student t-test and logistic regression were used to explain results and analysis of variables. The overall prevalence was 5.21 %(n=53/1016). The infection was mainly caused by Trypanosome congolense, 63.8% (n=35) and Trypanosome vivax 35.2% (n=19), which is statistically significant (P<0.05). Higher prevalence was registered in animals with poor body condition and black and related colour when compared with other categories and the difference was statistically significant. In contrast, was not statistically significant across study kebeles, age categories and sex groups (P> 0.05). The Mean packed cell volume (%) value of infected animals was (19.20±2.91) lower than uninfected animals (25.88±3.82), which is statistically significant. Flies were trapped using 480 baited stationary traps and the overall apparent density of flies was 2251 (2.34 f/t/d), two species of the genus Glossina (G.morsitans submorsitans (0.84 f/t/d) and G. Tachnoides (0.48 f/t/d) and two genera of biting flies (Stomoxy (0.53 f/t/d) and Tabanus (0.46 f/t/d) were caught, identified and estimated in relation to season, altitude levels, vegetation types and trap types. Higher proportion of flies was caught in the riverine vegetation type, lowland areas, wet/rainy season and monoconical traps as compared to associated corresponding factors for vectors. The relative abundance of vectors caught and trypanosome detected confirmed the continuous challenge of the disease in the settlement areas. Therefore, the ongoing community based vector and trypanosomosis integrated prevention/control strategy should be strengthened in the area to safeguard cattle production and productivity.

3.03

AN ATLAS TO SUPPORT THE PROGRESSIVE CONTROL OF TSETSE-TRANSMITTED ANIMAL TRYPANOSOMOSIS IN GHANA

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Abstract

Tsetse-transmitted African animal trypanosomosis (AAT) remains a major constraint to sustainable development and food security in Ghana. Data on the geographical distribution of the tsetse vector and the disease, as well as on control activities, are available in the country. However, information is scattered and not harmonized, thus hampering analysis and evidence-based decision-making. An atlas was developed to provide comprehensive information on the distribution and prevalence of the disease and the tsetse vectors, as well as on control activities.

For 1990–2022 field data on tsetse and AAT occurrence were collated, harmonized, georeferenced and centralized in a single database. Past, ongoing and planned control activities were also collated and reviewed. By using the Progressive Control Pathway (PCP) as a framework, a self-assessment of the national capacity for AAT control was undertaken. The different information layers were combined to map the PCP status of the different regions in Ghana. For the tsetse component, over 200 trapping records corresponding to over 250 locations were included. Maps for the three economically important tsetse species in Ghana were generated (i.e. Glossina tachinoides, G. palpalis, and G. morsitans). For the AAT component, approximately 250 herd-level surveys and 16,000 tested animals were included. Trypanosoma vivax is widespread in the country, while T. brucei and T. congolense have a more limited distribution. The capacity self-assessment suggests that Ghana meets the criteria for stage 1 of the PCP at the national level, with some regions (e.g. the Upper West and the Upper East) could be considered at stage 2 (i.e. reduction of the AAT burden).

Despite gaps, a national atlas was successfully developed and combined with control data to map the status of AAT control in Ghana. To advance further in the PCP, a road map and financial resources to implement it are needed.

Keywords: Tsetse, Glossina, African animal trypanosomosis, GIS, atlas, Ghana, epidemiology.

3.04

PREVALENCE OF BOVINE TRYPANOSOMOSIS, APPARENT DENSITY OF TSETSE FLIES AND FARMER'S PERCEPTIONS ON THE IMPACT OF CONTROL PROGRAM IN KELLEM WOLLEGA ZONE, WESTERN OROMIA, ETHIOPIA

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Summary

Bovine trypanosomosis is the major challenge of animal health in sub-Saharan Africa, which is transmitted by tsetse and other biting flies. A cross-sectional study was conducted in Dale Wabera and Dale Sadi districts of Kellem Wollega Zone to assess the distribution and apparent densities of vectors, to determine the prevalence of bovine trypanosomosis and to assess the farmer's perceptions on the impact of control program of the bovine trypanosomosis. A total of 100 monopyramidal baited traps were deployed for 48 hours in six peasants associations to collect tsetse flies. Blood samples were randomly collected from 589 cattle, centrifuged and the buffy coat examined under the microscope for the parasitological study. Finally, a total of 105 villagers were interviewed. The study revealed 4.8 tsetse flies per trap per day and 8.7% of bovine trypanosomosis prevalence. The species of tsetse flies caught were G.pallidepes, G. m. morsitans, G. f. fuscipes and G. tachnoides and trypanosoma species are trypanosoma congolense (86.3%) and T.vivax (9.8%). Mean packed cell volume of parasitaemic animals were significantly lower than those of aparasitaemic ($P<0.05$). Among the respondents about 97% knew tsetse flies as the vector of trypanosomosis, 87.6% treated their animals at the government veterinary clinic and the rest treated their animals at home by buying trypanocidal drugs from private drug shops. Although farmer's awareness developed on the problem, means of transmission and control program of bovine trypanosomosis, the apparent density of tsetse flies and prevalence of trypanosomosis is still significant. Therefore, the control program should be intensified.

3.05

PREVALENCE OF BOVINE TRYPANOSOMOSIS AND APPARENT DENSITY OF TSETSE FLIES IN SAYONOLE DISTRICT OF WESTERN OROMIA, ETHIOPIA

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Summary

Bovine trypanosomosis is the most serious animal health problem in sub-Saharan Africa and is caused by different species of unicellular protozoal parasites found in the blood and other tissues of vertebrates. A cross-sectional study was carried out in Sayonole district to determine apparent density of the tsetse and other biting flies and prevalence of bovine trypanosomosis. The traps were deployed to collect tsetse and other biting flies and buffy coat technique for the parasitological study. About 43 monopyramidal traps were deployed for 48hr to collect tsetse and other biting flies. The study revealed 13.01 tsetse flies per trap per day, 4.67 stomoxys flies per trap per day, 0.26 tabanus flies per trap per day and 16.9% prevalence of bovine trypanosomosis. The species of tsetse flies such as G.m.submorsitans, G.pallidepes, G.f.fuscipes and G.tachinoides were captured in the study area. Blood samples were collected from 599 cattle, centrifuged and the buffy coat examined under the microscope for the parasitological study. The trypanosoma species detected in the study area are Trypanosoma congolense (79.2%), T. vivax (10.9%), mixed infection (T. congolense and T. vivax) (9.9%). Mean packed cell volume of parasitaemic animals were significantly lower than those of aparasitaemic ($P<0.05$). The study concluded that tsetse flies are an important vector for the epidemiology of bovine trypanosomosis in Sayonole district. There is a significantly high prevalence of bovine trypanosomosis. Therefore, there should be an introduction of disease and vector control and prevention methods to improve livestock production and productivity in the study area.

3.06

AN ATLAS OF SURRA IN SPAIN: PRELIMINARY RESULTS

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Trypanosoma evansi (T.evansi) is responsible for the form of animal trypanosomosis known as "surra". This disease causes important socio-economic losses. We collected all available data on T. evansi infections in Spain, with a focus on the Canary Islands, with a view to creating a national atlas. A digital repository was created with information compiled from 30 different published and unpublished sources, covering the period 1997–2022. Data were harmonized, georeferenced and entered in a single database. A total of 9,225 animals were tested, including dromedaries (64 %), goats (15%), sheep (8%), cattle (3%), and equids (10%). A 7,1% prevalence rate was detected, mostly dromedaries (70.3%), followed by sheep (12%), goats (8.4%), equids (5.8%) and cattle (3.5%). Detection was primarily realized using serodiagnostic test (CATT/T.evansi). The samples came mainly from the islands of Gran Canaria, Fuerteventura, and Lanzarote and, to a lesser extent, from Tenerife, La Palma, and Alicante (the latter in mainland Spain). The outbreak on the mainland was caused by the importation of infected camels from the Canary Islands. Over the years, there has been a relevant decrease in the number of positive cases, and the incidence of animal trypanosomosis in Spain is nowadays very low, if any cases occur at all. The creation and regular update of the atlas provides a comprehensive picture on surra in Spain, thus allowing an improved design of surveillance and control activities.

3.07

ROLE OF TABANIDS AND STOMOXYS IN THE EPIZOOTIOLOGY OF ANIMAL TRYPANOSOMOSIS IN CAMEROON

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Tabanids and Stomoxys are important pests of livestock in rangelands and their role as biological transmitters of African Animal Trypanosomosis has not yet been fully established. To contribute in the establishment of the role of these two symbovine vectors in the transmission of AAT in Cameroon, a three year (2015-2017) entomological study was conducted in eight regions of the country including major cattle production areas to update on their fauna and samples (tabanids and stomoxys as well as cattle samples from the same area) from a tsetse free area were tested for the presence of the DNA of Trypanosoma spp. A total of 25 280 tabanids belonging to 25 species were collected, including eight species not previously documented in Cameroon. The highest apparent density of tabanids was recorded in the Far North region, and the mean apparent densities of species with sites was statistically signifcantly diferent (Student t-test: 2.519, df=24, P=0.019). A total of 77 804 Stomoxys specimens were collected, and eight species identified. The highest apparent density range of 101 to 200 Stomoxys per trap per day (s/t/d) was recorded in the Far North region. In the tsetse free area of Cameroon, the tabanid trypanosomal DNA presence was 24.4% (95% CI: 11.25–37.53), while the bovine trypanosomal DNA presence was 4.8% (95% CI: 1.68–11.20). The Trypanosoma spp. identified in tabanids were T. theileri, T. vivax and T. evansi, while those in cattle were T. theileri and T. vivax. The control of tabanids and Stomoxys is required to stop the mechanical spread of AAT in Cameroon. A more profound study is required for both tsetse infested and free areas to define the role of these two important fly-groups in the epizootiology of AAT.

Keywords : animal trypanosomosis, tabanids, stomoxys, tsetse, region

3.08

MOLECULAR EPIDEMIOLOGICAL SURVEY OF PATHOGENIC TRYPANOSOMES IN NATURALLY INFECTED CATTLE IN NORTHERN CÔTE D'IVOIRE

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ABSTRACT

Bovine trypanosomiasis is a significant health concern for livestock intensification in Côte d'Ivoire. This study aimed to determine the prevalence and distribution of pathogenic trypanosomes and identify the most infected cattle breed in northern Côte d'Ivoire. We examined 700 cattle and found that polymerase chain reaction (PCR) was more sensitive (12.3%) than microscopic observation (5.6%). Among the trypanosome species detected in naturally infected cattle, Trypanosoma vivax was 7.3%, Trypanosoma simiae tsavo was 6.7%, and Trypanosoma congolense was 0.4%. The overall prevalence of trypanosome infection in all cattle breeds was 12.3%, while the prevalence in individual breeds was 14.8%, 7.3%, 10.6%, and 12.3% for N'Dama, Baoule, Zebu, and Mere breed, respectively. The infected animals had low packed cell volume, influencing the prevalence. Our findings indicate that bovine trypanosomes are prevalent in Côte d'Ivoire, and their prevalence varies by region and breed. These pathogens include T. vivax, T. simiae tsavo, and T. congolense.

Key words: Trypanosomiasis, prevalence, cattle, Côte d'Ivoire

3.09

MAPPING THE PATHWAY FOR PROGRESSIVE CONTROL OF ANIMAL TRYPANOSOMOSIS IN KENYA

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Abstract

African Animal Trypanosomosis (AAT) remains a major constraint to economically viable production in the tsetse-infested livestock keeping areas of Kenya. To help minimize its burden and, where possible, create free areas the Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC) adopted the Progressive Control Pathway (PCP) as a strategic approach to AAT reduction and elimination. As a data-driven, evidence-based approach, the PCP required an epidemiological atlas of tsetse and AAT distribution to be developed. Firstly, all data collected by KENTTEC from 2006 in the context of periodic monitoring activities were assembled. Secondly, additional epidemiological data from stakeholders was incorporated. Lastly, all KENTTEC data on tsetse and AAT control activities were centralized in a separate database, a 'control atlas' as it were. The combined analysis of epidemiological and control data enabled mapping of the status of AAT control in the different areas of the country. The 'County', which is the first administrative unit in Kenya, was used as the unit for PCP mapping. Sixteen (16) counties were tentatively assigned to stage 2 of the PCP hierarchy (i.e. reduction of AAT burden), 3 in the advanced stage (i.e. sustainable and economically-profitable reduction achieved) and 13 in the early stage (AAT reduction initiated). The other 31 counties are still considered to be at stage 1, with 7 counties at stage 1 advanced (with reference data available) and 24 at stage 1 early (without reference data). In addition to the PCP mapping, the Council is also in the process of aligning its policy documents with the PCP, and in particular its strategy and work plan. Finally, a roadmap was drafted to outline how each County is planned to advance along the PCP in the next ten years, including the related surveillance and control activities.

3.10

WHAT SUSTAINS TRYPANOSOMIASIS IN THE ABSENCE OF ITS BIOLOGICAL VECTORS.

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Trypanosomiasis is a wasting disease that remains in the host blood once infected for long time as subclinical infection. Intriguingly, infections with low or undetectable trypanosomes are common, particularly in the case of animal trypanosomiasis and surra caused by various trypanosomes. However, the effect of subclinical trypanosomes infection on camel health and productivity is less understood. Here, we show using molecular, epidemiological, and microscopically that abortion affects up to 38 % of pregnancy in camel populations and camel calf mortality is high, up to 50% in surra endemic areas of northern Kenya due to vertical transmission of surra. Furthermore, surra induced abortion happens repeatedly up to 9 times per camel. Camels with subclinical T. evansi infection abort more repeatedly as compared to the non-infected camels. Here we will discuss the dynamics of surra transmission, the importance of early diagnosis to avert surra induced abortion using simple biomarker based surra diagnosis combined with vector control.

3.11

TSETSE AND ANIMAL TRYPANOSOMIASIS IN SOMALIA: PAST, PRESENT AND FUTURE DIRECTIONS

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Abstract

Tsetse and Trypanosomiasis (T&T) remain a constraint to sustainable livestock production in Africa. Since 1921, African Animal Trypanosomiasis (AAT) is a significant livelihood-limiting disease, contributing to poverty and food insecurity in Somalia. About 4.8% of southern Somalia is tsetse-infested, putting 17.2 million livestock at risk of trypanosomiasis. The other regions are struggling with non-tsetse-transmitted trypanosomiasis. In this report, we analyse the current knowledge of T&T in Somalia over a century (1921–2023) and guide future research and control strategies. In Somalia, the prevalence of trypanosomiasis was 4% to 28.6% in ruminants and 1.7% to 56.4% in camels, with an estimated economic loss of 88 million USD annually. Because of its socioeconomic importance, trypanosomiasis has been prioritized. A successful National T&T Control Project was implemented in the 1980s, which later showed re-infestation. Additionally, the ICRC implemented T&T control between 2015-2017 with initial success, but it was not sustained. The community uses trypanocides and pesticides widely, which increases drug resistance. Currently, there are no control efforts, and the available information doesn't provide a comprehensive understanding of the epidemiology and socio-economic impact of the disease. Human African trypanosomiasis was not reported in Somalia, despite the presence of vectors and transhumance practices. Realising the economic losses due to AAT and the risk of the introduction of sleeping sickness in the country, accurate and efficient identification of trypanosomes is vital to assess the disease risk in the country and to develop a better control strategy that contributes to the improvement of animal health, production, and livelihoods.

Keywords: Trypanosomiasis, Glossina spp., Community-based tsetse fly control, Somalia.

3.12

WHAT DO WE KNOW ABOUT ANIMAL TRYPANOSOMOSIS (AT) IN TSETSE-FREE AREAS IN SENEGAL?

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Animal Trypanosomosis (AT), in its various forms, occurs in virtually all countries in Africa. The causative agents are cyclically transmitted by tsetse flies (Glossina spp.). In tsetse-free locations, other biting insects including stable flies (Stomoxys flies) and horseflies (Tabanids) can also mechanically transmit various trypanosomes. In tsetse-free areas, these flies may play an important part in the epidemiological cycle of AT.

In Senegal, AT is one of the main constraints to the development of intensive production systems, especially in tsetse-infested areas.

As part of better understanding the epidemiological cycle of AT in tsetse-free areas of Senegal, river valley and Sylvopastoral areas, we investigated the seasonal dynamics and ecology of the mechanical vectors, as well as the seroprevalence of the disease in a variety of potential hosts, including cattle, goats, horses, and sheep. According to our findings, Senegal's tsetse-free areas have a circulation of AT and a high diversity of hematophagous flies (mechanical vectors), with more than fourteen species divided into 3 genera (Haematobia, Stomoxys and Tabanids.

3.13

EVALUATION OF UGANDA'S AFRICAN ANIMAL TRYPANOSOMIASIS BURDEN OVER THE PAST 42 YEARS

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Abstract

Animal African Trypanosomiasis [AAT], a devastating livestock disease caused by Trypanosoma species, is a major constraint for animal health and integration of crop-livestock production in sub-Saharan Africa. Surveillance and control programs rely on detailed understanding of underlying epidemiologic scenarios. In this study, we obtained published AAT prevalence estimates for Uganda in multiple domestic animal species over the last 42 years and conducted meta-analyses, generating national and district-level AAT prevalence estimates. PubMed, Scopus, ScienceDirect, Springer Nature and Web of Science databases were searched and retrieved through each database's application programming interface [API]. Following PRISMA guidelines, 56 articles were included in the analyses. Of the 40 districts where cattle were sampled, less than half [n = 13] represented the districts with the highest livestock density [cattle corridor],

highlighting an urgent need to screen livestock in the rest of the cattle corridor districts for which there are no AAT burden data. Moreover, molecular diagnostic techniques depicted cattle to have the highest AAT prevalence [22.15%, 95% CI: 15.87-29.14]. Across all species sampled, ~46% of districts sampled have a low AAT prevalence [<= 10%] with nearly one-third [~31%] of all districts estimating a medium to high average prevalence [> 20%]. Over the past 42 years, there has been progressive reduction in AAT burden in cattle, sheep, and pig populations. Despite this reduction, national cattle AAT burden remains high [16.81%, CI:13.56- 20.33] across all diagnostic methods. Limitations are acknowledged as most of studies included [71.4%] either did not conduct sample size calculations or otherwise failed to explicitly justify their number of recruited animals. Nevertheless, these findings indicate that for most of Uganda livestock producing districts, AAT remains a major constraint to animal health and production calling for interventions targeted at medium to high

3.14

AN UPDATE OF THE CONTINENTAL ATLAS OF TSETSE AND ANIMAL AFRICAN TRYPANOSOMIASIS IN NIGERIA.

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ABSTRACT

Animal African trypanosomiasis (AAT) transmitted by tsetse fly is a major disease, challenging sustainable livestock development in Nigeria. Recently developed continental atlas for tsetse and AAT (T&AAT) in Nigeria featured only peered-reviewed scientific publications while unpublished data and local publications were excluded. Inclusion of these data generated from Nigerian Institute for Trypanosomiasis Research (NITR) is necessary to improve the continental atlas, as this will eventually form a data repository in developing the national atlas. This retrospective study seeks to update the existing atlas. Spatially-explicit database was created, and all data collected from NITR's country-wide field research activities from 2014 – 2022 were identified, collated and stored in the data repository. For the entomological data collections, Bi-conical and Vouvoa traps were used, while Giemsa stained thin films, buffy-coat and haematocrit centrifugation techniques (HCT) were used to detect AAT. In all locations of tsetse trappings, 1041 tsetse flies were caught with apparent densities between 0.2- 3.7 tsetse/trap/day. Two species of Glossina were detected; G. tachinoides (42.7%), G. Palpalis (57.3%) with infection rate (22.6%) due to Trypanosoma vivax (63.8%) and T. congolence (36.2%). A total of 2,838 animals were screened for AAT in approximately five locations, 73.5% (2087) were cattle. AAT was established in all study areas, with infections detected in 68 animals, and caused by T. vivax (0.3% infection), T. congolense (2.4%) and T. brucei (0.7%), respectively. In conclusion, regular update of national database of T&AAT is significant to offer more epizootiological evidence for informed decision making in control interventions.

Keywords: Nigeria, Tsetse, Animal African Trypanosomiasis, GIS, Database, Atlas

3.15

DEVELOPING AN ATLAS OF TSETSE FLIES AND AFRICAN ANIMAL TRYPANOSOMOSIS IN CÔTE D'IVOIRE

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African animal trypanosomosis (AAT) is one of the main causes of livestock mortality in Côte d'Ivoire. Information on the occurrence of tsetse flies and AAT is available for different regions of Côte d'Ivoire. However, the lack of synoptic information on the disease and its main vectors limits the possibility of rationally planning control actions and estimating the impact of interventions. To meet this challenge, Intitut Pierre Richet and Veterinary Services Department (DSV) are involved in the development of a dynamic geospatial database of tsetse and AAT distribution in Côte d'Ivoire. As a first step, all tsetse and AAT data collected in the field by the Institut Pierre Richet from 2005 to June 2023 have been assembled, georeferenced and harmonized. The tsetse data presently cover 19 of the country's 31 regions. AAT data cover 10 regions. For the tsetse component, approximatively 3000 trapping sites have been recorded, corresponding to more than 3500 different trapping events and an overall trapping intensity of over 9000 trap days. More than 21,000 tsetse flies belonging to 8 species divided into the three groups of tsetse were captured (Glossina palpalis, G. tachinoides, G. pallicera, G. longipalpis, G. morsitans, G fusca, G. nigrofusca and G. medicorum). Glossina palpalis was the most abundant species, with a wide distribution throughout the country. The AAT data are more limited; however they show a fairly high prevalence in the Savanes district, which is the country's main livestock area. The development and regular updating of a comprehensive

national database on tsetse and AAT is essential to guide decision-making for progressive disease control.

Keywords: Tsetse fly, African animal trypanosomosis, atlas, Ivory Coast

3.16

DESIGN AND PRODUCTION OF FIVE CHIMERIC MULTIVALENT PROTEINS FOR THE SEROLOGICAL DIAGNOSIS OF AFRICAN ANIMAL TRYPANOSOMIASIS

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Abstract

Reliable diagnostic tools are a prerequisite for any campaign against animal trypanosomiasis. Serological diagnosis by ELISA is well-suited to surveillance because it enables high-throughput tests to be carried out, is inexpensive and can be adapted to a rapid format. The antibody ELISA recommended by the WOAH (founded as OIE), based on trypanosome lysates purified from rodent blood, offers good sensitivity but may lack specificity and is difficult to standardise. The use of recombinant proteins bypasses the problems of standardisation and ethical considerations, but although they tend to increase specificity, they may do so at the cost of sensitivity. Recent studies have shown that combining several recombinant proteins can increase sensitivity while maintaining good specificity. The aim of our study was therefore to use genetic engineering to produce chimeric proteins composed of the most immunoreactive regions from several antigens. An inventory of candidate antigens for serological diagnosis was used to select the proteins with the best potential. The regions of interest were selected using bioinformatics tools and combined end-to-end to construct five chimeras in silico. Their nucleotide sequences were synthesised and each cloned into three expression vectors, from which they were expressed in Escherichia coli and then purified by affinity chromatography. Their reactivity with reference sera has been assessed, and the preliminary results are promising. The next phase will involve testing these chimers with field sera.

3.17

CHARACTERIZATION OF THE EVOLUTION OF BASIC HAEMATOLOGICAL AND BIOCHEMICAL VARIABLES IN RELATION WITH BOVINE TRYPANOTOLERANCE DURING AN EXPERIMENTAL INFECTION BY TRYPANOSOMA CONGOLENSE

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Abstract

Animal trypanosomosis cause major livestock losses in Africa. Abnormal haematology and biochemical parameters in infected animals were reported, however the potential relationship of these two parameters with tolerance or susceptibility to the disease remains unclear. The present study aimed to monitor the haematological and biochemical parameters and to identify the biological variability associated with tolerant versus susceptible phenotypes. For this purpose, 7 N'Damas, 9 Fulani Zebus and 8 crossbreds (Fulani Zebu X European taurine), aged between 2-3 years, were infected intradermally with Trypanosoma congolense IL1180. Blood samples were collected on each cow prior and during infection for parasitological analysis and haematology and biochemical parameters assessment using respectively KHEMA4® and KBIO5® analysers (Kitvia). As expected, N'Damas showed the best anaemia control indicators compared to Fulani Zebus and crossbreds, which were sometimes anaemic. Prior infection, no significant difference in biological variables was observed between the breeds. However, after five months of infection a significant difference ($p<0.05$) in leukocyte counts and lymphocytes were recorded, with higher leukocytosis and lymphocytosis for N'Damas and intermediate values for crossbreds and Fulani Zebus. For biochemical variables such as levels of cholesterol, urea, albumin, alkaline phosphatase and glucose, values were higher in Fulani Zebus and crossbreds than N'Damas. However, globulin, alamine-amino-transferase, amylase, creatinine, □-GT and total proteins levels were higher in N'Damas than Zebus and crossbreds. Our study revealed major changes in haematology and biochemical variables associated with disease development.

The role of each variable and how it may interact was therefore discussed in the context of trypanotolerance.

Key-words: Trypanosomosis, Trypanosoma congolense, cattle breeds, trypanotolerance, haematology, biochemistry

3.18

MOLECULAR AND MICROSCOPY DIAGNOSES OF THE GAMBIAN CATTLE FOR THREE TRYPANOSOMES

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ABSTRACT

This study aimed to determine the national prevalence of Trypanosoma congolense, T. vivax, and T. brucei brucei responsible for Animal African Trypanosomiasis by using molecular (polymerase chain reaction - PCR) and microscopy diagnoses (buffy coat technique - BCT). In total, 921 cattle blood were sampled in both rainy and early dry seasons from 36 herds in five out of six regions of The Gambia. Breed, sex, age, body condition, and coat colour of the sampled cattle were also recorded. Deoxyribonucleic acid (DNA) was extracted from the blood samples with the IndiSpin® Pathogen Kit. The PCR assays (real time and conventional) mostly involved 25 µL total volume. Based on BCT, overall trypanosome prevalence was 2.5% (95% confidence interval (CI): 1.5 – 3.5) with both T. congolense and T. vivax in almost equal proportion regardless of the season while trypanosome prevalence was much higher in male (5.1%; CI: 2.3 – 7.9) than female animals (1.6%; CI: 0.7 – 2.6). Just as in the BCT, no sample was positive for T. b. brucei with PCR, which implies a zero prevalence for this particular trypanosome species. Given the incongruence with regard to amplification curves from the pooled and individual samples analyzed, and also between BCT and PCR, the molecular diagnoses for T. congolense and T. vivax DNA were considered inconclusive and some possible reasons highlighted accordingly. This study provides evidence and lessons for future work concerning diagnosis for trypanosome species in cattle, especially those infected under the natural field-based conditions of Africa.

3.19

A COMPARATIVE EVALUATION OF LAT, ELISA AND SAT TESTS FOR DIAGNOSIS OF ANIMALS (SHEEP AND GOATS) TRYPANOSOMOSIS IN KHARTOUM STATE

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Abstract

This study was performed to determine the sensitivity and specificity of serological in detection of trypanosomosois to compare the eligibility of serological and in detection of Trypanosoma Spp.in animals serum and determine the seroprevalence of the trypanosomosis Khartoum. The tests used in the study were LAT, SAT and ELISA. A total of 540 serum of sheep samples was diagnosed and the seroprevalence was 33%, 23 %, 57.4%, using LAT, SAT , and ELISA respectively.

The highest sensitivity obtained by ELISA (64%) followed by, LAT (30%) and SAT(15%) in sheep and 55%,25%,20% from 730 serum of goats respectively.

Key words: Trypanosomosis, Serological Test, Sheep,goats and Khartoum State.

3.20

APPLICATION OF SHERLOCK DETECTION FOR EPIDEMIOLOGICAL SURVEYS OF ANIMAL AFRICAN TRYPANOSOMIASES

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Animal African trypanosomiasis (AAT) is a disease caused by parasites of the genus Trypanosoma. After the successful development of a diagnostic test for human African trypanosomiasis, we have adapted the CRISPR-based detection toolkit SHERLOCK (Specific High-sensitivity Enzymatic Reporter unlocking) for trypanosomatid parasites responsible for AAT. SHERLOCK first amplifies nucleic acid using recombinase polymerase amplification (RPA), which is then combined with the Cas13a nuclease for RNA target recognition via specific guides (crRNAs) and a fluorescent reporter linked to a quencher. Target sequence recognition by Cas13a results in promiscuous ribonuclease activity which cleaves the fluorescent reporter, emitting fluorescence used for detection. To test the applicability of this technique in the field, we analysed 360 domestic animal samples (sheep, goat, pig and dog) from two surveys in Cameroon and Côte d'Ivoire. The preliminary results of this pilot study show that the SHERLOCK4AAT method is able to detect and discriminate between trypanosome species involved in multiple infections with a high sensitivity, especially in blood samples. In Côte d'Ivoire, we determined that approximately 60% of the Trypanozoon-positive blood samples collected on free-ranging pigs were co-infected with T. congolense, while no T. vivax infections were detected.

We are now focussing on further improving the sensitivity of the assay and developing a multiplex version for species discrimination in a single test.

3.21

RESISTANCE TO TRYPANOCIDAL DRUGS IN CATTLE POPULATIONS OF HOMABAY COUNTY, KENYA

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Abstract

There is scanty information on the prevalence of Diminazene Aceturate (DA) resistance in Kenya despite its widespread use. Various reports from different countries have indicated the presence of resistance by trypanosomes to DA to various degrees. This project seeks to obtain data on the epidemiology of trypanosomes resistant to Diminazene Aceturate in order to inform policy on trypanocidal usage, add to our local knowledge of trypanosomiasis and provide pointers to the management of Animal African Trypanosomiasis in Kenya. This study will be conducted in selected villages in the Lambwe Valley in South West Kenya, Homabay County, where tsetse and Trypanosomiasis has been a menace for a long time. 100 samples will be collected based on an expected prevalence rate of 10% with a desired absolute precision of 5% at a confidence level of 95%. The Buffy Coat Technique (BCT) will be used to test cattle for trypanosomiasis in the field and part of the blood from positive animals be preserved for PCR analysis. All animals that test positive will be tagged and treated with DA 3.5 mg/Kg on day one then monitored with BCT and PCR on days 7 and 28. Positive cases on days 7 and 28 will be analysed for presence of trypanocide resistant genes using PCR-RFLP. The data from this study will be analyzed using excel and will be presented in tables, graphs and charts. This study will be conducted between June and August 2023 and all is set for the field work in Homabay County and laboratory work at the International Centre for Insect Physiology and Ecology (ICIPE).

3.22

ASCOFURANONE (AF) ANTIBIOTIC IS A PROMISING TRYPANOCIDAL DRUG FOR NAGANA

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Abstract

African Trypanosomiasis is a disease complex which affects both humans and animals in sub-Saharan Africa, transmitted by the tsetse fly (Glossina spp.) distributed within the tsetse belt of Africa but some trypanosome species e.g., Trypanosoma brucei evansi, T. vivax, T. theileri and T. b. equiperdum are endemic outside the tsetse belt of Africa transmitted by biting flies e.g., Tabanus and Stomoxys, or venereal transmission respectively. Trypanocidal drugs remain the principal method of animal trypanosomosis control in most African countries. However, there is a growing concern that their effectiveness may be severely curtailed by widespread drug resistance. Thus, there is an urgent need to develop new drugs. A minimum number of six male cattle calves (crosses of Friesian breed) were recruited for the study. They were randomly grouped into two (T. vivax and T. congolense groups) of three calves each. One calf per group served as a control while two calves were treatment group. They were inoculated with 105 parasites in PBS in 2 ml. When parasitemia reached 1x107.8 trypanosomes per ml in calves, treatment was instituted with 20 ml (25 mg/kg (in 100 kg calf) ascofuranone (AF) for treatment calves while the control ones were administered a placebo (20 ml PBS) intramuscularly. This study revealed that T. vivax was successfully cleared by AF but the T. congolense group was not cleared effectively. It is suggested that the compound can be developed further to be a sanative drug for T. vivax in non-tsetse infested areas like South Americas.

Key words: Ascofuranone; Trypanocide; Trypanosoma congolense; T. vivax

3.23

PRELIMINARY RESULT ON VACCINE AGAINST TRYPANOSOME USING BASED ON NANOPARTICLE LOADED WITH ANTIGEN

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Abstract

Trypanosomiases remain a human and animal health problem. Significant progresses have been made in the diagnosis and treatment of gambian human African trypanosomiasis. However, vaccination is the preferred way to fight or even eradicate an infectious disease, and to avoid resistance to therapy and drug toxicity. A new vaccine approach has been evaluated, using nanoparticles (NP) loaded with antigens from pathogens. Spectacular results were previously obtained in several infections. In toxoplasmosis, a parasitic disease, vaccination with NP loaded with antigens from Toxoplasma gondii resulted in 100% protection in mice, goats, and monkeys after infections. We have used the same nanoparticles loaded with antigens from Trypanosoma brucei brucei or T. congolense (NPT) in experimental murine trypanosomiasis. After two subcutaneous injections of NPT, mice were challenged with T. b. brucei or T. congolense. Preliminary results indicate a 50% protection. Experiments are in progress to optimize the vaccination parameters (choice of antigen, injected dose, administration schedule) and the protection's length. These NP are non-toxic, and they are stable for 6 months at 45°C. They represent a new approach to fight human and animal trypanosomiasis.

Keys-word: Vaccine, anti-trypanosome, nanoparticle, antigen

3.24

IN VITRO TRYPANOCIDAL ACTIVITY OF DIFFERENT EXTRACTS OF ELAEIS GUINEENSIS (ARECACEAE) AND KHAYA SENEGALENSIS (MELIACEAE) ON TRYPANOSOMA BRUCEI BRUCEI ISOLATED FROM WEST-AFRICAN CATTLE.

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African animal trypanosomiasis is one of the major constraints of cattle breeding in West Africa and in Benin particularly. Many farmers control this disease in traditional ways using different plants. The present study was intended to evaluate the trypanocidal potential activities of the most common ones among such plants. An in vitro trypanocidal test of the aqueous, hydro-ethanolic and ethanolic extracts of the leaves and roots of Elaeis (E.) guineensis and the stem bark of Khaya (K.) senegalensis was carried out at three concentrations (25, 50 and 100 mg/ml) on Trypanosoma (T.) brucei (b.) brucei (strain FARAKOBA 80). The in vitro assay was conducted out in triplicate in a 96-well microplate, using PBS as negative control and Veriben® a reference trypanocidal drug as positive control. The GLMMTMB package with a "betabinomial" family was used to analyse the data. Our results have shown that all aqueous, hydro-ethanolic and ethanolic extracts of K. senegalensis stem bark had significant trypanocidal effects on T. b.

brucei ($p < 0.001$), but no difference in efficacy was found between these types of extracts ($p = 0.16$) on the parasites. In addition, the concentration and post-exposure time of this extract, had an effect on trypanosome mortalities ($p < 0.001$). However, the different extracts of the leaves and roots of E. guineensis did not give conclusive results. According to the in vitro anti-trypanosomal tests, K. senegalensis stem bark extracts could constitute promising source of natural compounds of traditionally improved trypanocidal drugs at lower cost for low-income farmers.

3.25

IN VITRO AND IN VIVO ANTITRYPANOSOMAL EFFECTS OF HYDROMETHANOLIC EXTRACTS OF SOLANUM ANGUIVI FRUITS AND ECHINOPS KEBERICHO ROOTS

Debela Abdeta

ABSTRACT

Introduction: Trypanosomiasis is one of the world's most serious infectious diseases caused by Trypanosoma parasites. An increased drug resistance to conventional anti-trypanosomal drugs, increasing resistance of mosquito vectors to insecticides, challenge of having effective vaccines and adverse effects of the existing anti- trypanosomal drugs justifies the urgent need for more effective, tolerable and affordable drugs.

Objective: The present study aimed to determine the in vitro and in vivo antitrypanosomal effect of hydromethanolic extract of E. kebericho roots and S. anguivi fruits against field isolate of T. congolense.

Methods: The 80% methanol extracts of E. kebericho roots and S. anguivi fruits were prepared by cold maceration technique. In vitro, blood incubation infectivity test, curative and prophylaxis tests were done to check the effect of the plant extracts against T. congolense in Swiss albino mice. Extracts were administered at doses of 100, 200 and 400 mg/kg for curative and prophylaxis test while 1mg/ml, 2mg/ml and 4mg/ml concentration of the extract were used for in vitro and blood incubation infectivity test. Acute toxicity of the extracts at 2000mg/kg was performed according to OECD guide lines. Data obtained from the experiment was analyzed using one way ANOVA followed by Tukey test.

Results: The present study indicated that the extracts did not exhibit any signs of acute toxicity up to the dose of 2000mg/kg. The hydromethanolic extracts of E. kebericho roots and S. anguivi fruits affected motility at 0.5, 1, 2 and 4mg/ml in in vitro tests, and the entire tested group did not develop infection in mice inoculated with infected blood incubated with concentrations of the above extracts. In the prophylactic studies, groups provided with the hydromethanolic extracts before infection got prolonged incubation period with little chemoprophylactic effect at the doses of 100, 200 and 400 mg/kg. In curative test, the extracts reduced parasitemia, prevented drop in packed cell volume and body weight significantly ($p<0.05$), as compared to control. In in vivo models, the extracts did not prevent rectal temperature fluctuation. Phytochemical analysis showed the presence of flavonoids, triterpines, steroids, saponins, glycosides,

tannins and alkaloids.

Conclusion: The extracts showed in vitro effect and a promising curative and prophylactic activities. Further effort is required to isolate and purify specific compounds responsible for the antitrypanosomal activity of the studied plants.

Key words: Echinops kebericho, Solanum anguivi, trypanosomiasis, Trypanosoma congolense

3.26

THE EXTRACELLULAR REGION OF TRYPANOSOMA CONGOLENSE MEMBRANE BOUND ACID PHOSPHATASE INDUCES STRONG PROTECTION IN IMMUNIZED BALB/c MICE

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Towards development of vaccine against Animal African Trypanosomiasis (AAT), we have identified the Membrane-Bound Acid Phosphatase (MBAP; EC 3.1.3.2) of the bloodstream forms (BSFs) of trypanosomes as a promising antigen for vaccine design. The MBAP of BSFs is less susceptible to variation, plays a central role in molecular trafficking and has proven to be essential to the parasite by RNAi. In this study, we developed a DNA vaccine candidate targeting the extracellular region (EP) of T. congolense MBAP (TconMBAP) without its signal peptide (SP) using a native stabilate of the parasites and a Strep-tag/transin modified mammalian expression vector pVAX1. We showed the protective effects of the vaccine candidate against experimental infection with 104 T. congolense cells after two independent immunization trials. Each trial consisted of a prime and two boosts (100 µg/animal) regime during which sera were collected for Blood Incubation Test (BIT), immunoglobulin G (IgG), and cytokines (IL-10 and IFN-□) assay by ELISA. The vaccine candidate contributed to a net significant increase ($P<0.05$) of circulating IgG and an increased pre-patent period of up to 3 days in the vaccinated cohorts. And significantly increased levels of IL-10 ($P<0.05$) and no effect on IFN-□ ($P>0.05$) in all trials thereby creating a type II cytokines environment for the survival of the animals. This was reflected by the relatively low parasite load in the vaccinated cohorts characterized by multiple waves with the intermittent clearing of parasites to no detectable levels, and extension of the lifespan of up to 45.45% with a complete survival of 20% of mice in the second trial. This study suggests that EP-SP/pVAX1 has tremendous immunological potential.

Keywords: Trypanosoma congolense, TconMBAP, IFA, BIT, IgG, IL-10, IFN-□

3.27

DISCOVERY OF A NOVEL THERAPEUTIC CANDIDATE AGAINST ANIMAL TRYPANOSOMIASIS

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Animal trypanosomiasis (AT) is a widespread disease with a devastating impact on animal husbandry due to the scarcity of efficient drugs and development of drug resistance, hence emphasizing the need for novel treatment options. Following previous identification of 3'-deoxytubercidin as a highly potent trypanocide with curative activity in mouse models of both stage-1 and stage-2 Human African Trypanosomiasis (HAT), we now present a comprehensive preclinical evaluation of new 6-amino substituted tubercidin analogues with promising activity against a broad range of AT species. Potent hits were identified in vitro across all important AT species, i.e. Trypanosoma brucei brucei, sensitive and isometamidium (ISM)-resistant Trypanosoma congolense, Trypanosoma vivax, Trypanosoma evansi (type A and B) and Trypanosoma equiperdum. Selected 'hits' were further tested for in vitro metabolic stability (using bovine, horse and piglet liver microsomes), in vivo mouse models for each AT species, genotoxicity assays and mode-of-action studies (i.e. genome-wide RNA interference library screening, metabolomics). Analogue 3 was highly active in T. vivax, T. congolense, T. equiperdum, T. evansi and T. brucei curative mouse models. Furthermore, there was no indication of in vitro genotoxicity as confirmed by Vitotox®, the micronucleus and the comet assays. Mode-of-action studies for 3 revealed that the P1 nucleoside transporter and adenosine kinase are involved in drug uptake and activation, respectively. Given the preferred target product profile for a broad-spectrum drug against

AT, analogue 3 represents a promising 'lead' candidate for treatment of animal trypanosomiasis, regardless of the causative species.

3.28

QUANTIFYING REASONS FOR TREATMENT FAILURE WITH TRYPANOCIDES USED ON CATTLE

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African animal trypanosomiasis control is heavily dependent on a small number of trypanocidal drugs. Although treatment failure is commonly reported, the relative importance of different potential causes is rarely assessed. This study aimed to determine causes of treatment failure when farmers treat cattle with trypanocides. A longitudinal one-year observational study was initiated in June 2021 in a high-risk AAT area around Serengeti Ecosystem, Tanzania. Following recruitment of a cohort of 600 cattle, when farmers initiated a treatment with a trypanocide they called the project veterinarian to examine animal(s), collect blood samples and observe their treatment practices. Follow up blood samples were taken at one week and one month post-treatment with all trypanocides, and additional samples of two- and three-months post treatment for isometamidium to assess prophylaxis. During the study, 295 treatments were reported and documented, a rate of 0.5 treatments/cow-year. Approximately one third of the trypanocide administrations observed were considered inadequate, based on inadequate dose, inappropriate administration route, poor injection technique or inappropriate storage. Of the blood samples collected on the day of treatment, only 28% were PCR-positive for at least one of Trypanosoma congolense, vivax and brucei. Treatment and prophylactic failures occurred in animals treated inadequately but also in those that received appropriate treatments, which may indicate resistance. Whilst the prevalence of inadequate trypanocide administration highlights the need to maintain good practice in trypanocide administration, lack of availability of diagnostics remains the biggest barrier to appropriate use.

3.29

EPIDEMIOLOGICAL AND INTERVENTIONAL STUDY OF CAMEL TRYPANOSOMOSIS IN SELECTED DISTRICT OF SOMALI AND OROMIA REGIONAL STATES, ETHIOPIA.

Sisay Alemu Mamo

ABSTRACT

Camel Trypanosomosis (Surra) is one of the most important diseases which affect the health and production potential of camel in the area. A longitudinal study was conducted to investigate the conceivable (reservoir) host range, prevalence, associated risk factors, and vectors in Babile and Shinile districts. In addition, parasite (chemotherapy and chemoprophylaxis) and vector control (pour-on, insecticide-impregnated targets, and traps) methods were implemented. Among the 526 different species of animals examined, a considerably higher prevalence was observed in camels, goats, and bovines; however, a low infection of T. evansi was detected in sheep and donkeys. Both serum and entomological sample were collected 4 times a year to estimate the seasonal prevalence of T. evansi, and assess the abundance and diversity of vectors, respectively. A total of 1790 blood samples were collected before intervention (358 per season). T. evansi was detected in 5.1% and 8.73% of camels by using buffy coat method (BCM) and Card Agglutination Trypanosomiasis Test (CATT)/T. evansi), respectively. In this study, the prevalence of camel trypanosomosis was significantly higher in Babile (12.6%) than Shinile (5%) district ($P<0.05$), in adults (10.4%) than in young (7.7%) camels ($P<0.05$), in poor (20.8%) than good (3.4%) body condition camels $P<0.05$, and in wet (14.3%) than early wet (2.2%) season, ($P<0.05$). Biting fly with the highest apparent density was Stomoxys followed by Tabanus, Chrysops, and Haematopota species. Strong association was observed between the apparent density of biting flies caught and the incidence of T. evansi infection. Moreover, T. evansi infection was higher in anemic than non-anemic animals ($P<0.05$). The prevalence of camel trypanosomosis was significantly lower after intervention than before, as well as in the control areas (Fafan zone).. The implementation of diverse intervention methods on the parasite and its vectors clearly resulted in a decreased incidence of T. evansi infection. This interventional study might serve as model for the control of Surra in low-income settings with community participatory approach.

3.30

PREVALENCE OF BOVINE TRYPANOSOMOSIS, APPARENT DENSITY OF TSETSE FLIES AND FARMER'S PERCEPTIONS ON THE IMPACT OF CONTROL PROGRAM IN KELLEM WOLLEGA ZONE, WESTERN OROMIA, ETHIOPIA

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Summary

Bovine trypanosomosis is the major challenge of animal health in sub-Saharan Africa, which is transmitted by tsetse and other biting flies. A cross-sectional study was conducted in Dale Wabera and Dale Sadi districts of Kellem Wollega Zone to assess the distribution and apparent densities of vectors, to determine the prevalence of bovine trypanosomosis and to assess the farmer's perceptions on the impact of control program of the bovine trypanosomosis. A total of 100 monopyramidal baited traps were deployed for 48 hours in six peasants associations to collect tsetse flies. Blood samples were randomly collected from 589 cattle, centrifuged and the buffy coat examined under the microscope for the parasitological study. Finally, a total of 105 villagers were interviewed. The study revealed 4.8 tsetse flies per trap per day and 8.7% of bovine trypanosomosis prevalence. The species of tsetse flies caught were G.pallidepes, G. m. morsitans, G. f. fuscipes and G. tachnoides and trypanosoma species are trypanosoma congolense (86.3%) and T.vivax (9.8%). Mean packed cell volume of parasitaemic animals were significantly lower than those of aparasitaemic ($P<0.05$). Among the respondents about 97% knew tsetse flies as the vector of trypanosomosis, 87.6% treated their animals at the government veterinary clinic and the rest treated their animals at home by buying trypanocidal drugs from private drug shops. Although farmer's awareness developed on the problem, means of transmission and control program of bovine trypanosomosis, the apparent density of tsetse flies and prevalence of trypanosomosis is still significant. Therefore, the control program should be intensified.

3.31

PREVALENCE AND ASSOCIATED RISK FACTORS OF BOVINE TRYPANOSOMOSIS IN TSETSE SUPPRESSION AND NON-SUPPRESSION AREAS OF SOUTH OMO ZONE, SOUTHWESTERN ETHIOPIA

Tegegn Tesfaye

Summary

A cross-sectional study aimed to elucidate the prevalence of bovine trypanosomosis and its potential risk factors was conducted in tsetse suppression and non-suppression areas of South Omo Zone, Southern Ethiopia from November 2018- May 2019. A total of 1284 blood samples from local zebu cattle (642 each in dry and wet season) were examined by using buffy coat technique and thin blood smear method. The overall prevalence was 11.05 % with 14.33 % in dry and 7.78 % in wet season. According to multiple logistic regression analysis of tsetse suppression areas, higher prevalence in female than male (OR = 0.48, 95 % CI: 0.27, 0.83), in poor (OR = 3.25, 95 % CI: 1.26, 11.09) and medium (OR = 2.07, 95 % CI: 0.74, 7.37) than good body conditioned animals was recorded. Moreover, tethered animals (OR = 2.07, 95 % CI: 1.06, 3.92) were more likely to be infected than communal grazers and also higher prevalence in dry season than wet season (OR = 0.52, 95 % CI: 0.30, 0.87). Similarly, in tsetse non-suppression areas, higher prevalence in female than male (OR = 0.48, 95 % CI: 0.27, 0.85) and in wet season (OR = 0.41, 95 % CI: 0.23, 0.7) than dry season was recorded. Trypanosoma congolense and Trypanosoma vivax were found in cattle with the former more prevalent in both areas. Overall pooled mean packed cell volume (PCV) of parasitaemic animals (23.57 ± 3.13) was significantly lower than aparasitaemic animals (27.80 ± 4.95). Similarly, parasitaemic animals from tsetse suppression areas and tsetse non-suppression areas had significantly lower mean PCV than their aparasitaemic counterparts. Mean PCV of T. congolense (23.59 ± 3.22) infected animals was not different ($P > 0.05$) from T. vivax infected animals (23.26 ± 3.31). It was also indicated that the probability of anaemic animals to be parasitaemic was significantly higher ($P < 0.05$) than non-anaemic animals in both areas. In conclusion, the prevalence of trypanosomosis revealed its endemicity which bottlenecked the livestock production and productivity in the study area despite of tsetse suppression activities. Therefore, integrated parasite and vector control approach should be undertaken to curve the disease.

3.32

PREVALENCE OF CATTLE TRYPANOSOMOSIS AND TEMPORAL VECTOR DISTRIBUTION IN JIMA ARJO DISTRICT, UPPER DIDESSA VALLEY, WESTERN ETHIOPIA

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ABSTRACT

Trypanosomosis is a protozoan disease, mostly transmitted by the tsetse fly, Glossina species, which causes severe disease of livestock in Ethiopia. The disease is also widespread across the globe especially in sub-Saharan African states. A cross-sectional study with the objectives of determining the prevalence of bovine trypanosomosis and assess the apparent densities of the disease vectors was conducted from October 2019-July 2020 G.C in Jima Arjo district, East wollega zone, Oromia Regional State, Ethiopia. A parasitological study using conventional buffy coat technique was employed for the determination of prevalence of trypanosomosis and species was identified by Giemsa stain technique while baited traps were used for the vector survey. The results of parasitological study revealed that the overall prevalence was 36(8.2%) at 95% CI. From the total trypanosome positive animals 22(5.0%), 8(1.82%) and 6(1.36%) of them harbor T. congolense, T. vivax and T. brucei respectively. Relatively higher prevalence (10.91%) was seen in animals with poor body condition than those with medium (7.38%) and good (5.55%), body condition though it is not statistically significant (P >0.05). Higher infection rate was observed in male 26(12.26%) than female 10(4.39%) due to male cattle are more exposed to the tsetse fly area or early released from home for drought reason. Out of the total positive animals; only 12 of them were anemic on buffy coat test of sampled blood. This justifies animal could be positive for trypanosomosis without showing clinical sign of anemia which is the dominant sign in this disease. A total of 2185 vectors trypanosomes were collected among which 1569 were tsetse flies and 616 were other biting flies. The density of Glossina species was 15.1 Fly/trap/day. Glossina morsitans submorsitans and G. tachnoides were the two dominant species of tsetse flies recorded from the area. The present study indicated that tsetse and non-tsetse fly borne trypanosomosis is a leading bottle neck for production and health of animals in Jima Arjo districts and similar case was found throughout the country which necessitates a coordinated vector and parasite control in order to alleviate the problem of the disease.

Key Word: Bovine, Jima Arjo, Packed cell volume, Trypanosomosis, Vector

3.33

ORAL PRESENTATION: THEMATIC AREA 4 PREVALENCE OF DRUG-RESISTANT TRYPANOSOMES AND APPROPRIATE USE OF TRYPANOCIDES TO RESTRICT MULTI-DRUG RESISTANCE DURING CHEMOTHERAPY OF ANIMAL AFRICAN TRYPANOSOMIASIS

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Abstract

The prevalence of drug-resistant trypanosomes in endemic regions of Kenya is poorly understood and paucity of data greatly hinders optimal veterinary management practices. This study aimed to establish Animal African Trypanosomiasis (AAT) point prevalence, drug susceptibility of associated trypanosomes, and measure infectivity by multiple AAT mammalian hosts to tsetse flies in Shimba hills, Kwale county, Kenya. We collected tsetse flies using Ngu and biconical traps, and then sorted them based on sex and species. Trypanosomes present in tsetse flies were detected by first extracting all genomic DNA, and then performing PCR reactions with established primers of the internal transcribed spacer regions. Polymorphisms associated with trypanocide resistance in the TbAT1 gene were also detected by performing PCR reactions with established primers. Our findings suggested low trypanosome prevalence (3.7%), low trypanocide resistance, and low infectivity by multiple mammalian hosts to tsetse flies in Shimba hills. In the epidemiological survey, we collected data on trypanosomiasis incidence using bovine blood samples and PCR to establish AAT point prevalence, which was 4% and 11% in Kizibe and Mbegani villages respectively. Using these results, mathematical model predictions were developed to highlight appropriate drug regimens that impede trypanocide resistance development in cattle. We infer that cycling trypanocides from three different classes in decreasing order of resistance, treating up to 80% of an exposed population and combining drugs with the least resistance provide optimal regimen options to diminish the spread of resistant trypanosomes in endemic regions. Enhanced surveillance of the vector is crucial for informing disease management practices.

3.34

SURRA IN A DRAUGHT DROMEDARY CAMEL-BULL FROM NIGERIA: CASE REPORT

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Trypanosoma evansi infection is among the most devastating disease of camels worldwide. However, in Nigeria clinical surra is less known compared to other forms of African animal tryanosomosis. The diagnosis and treatment of trypanosomosis in draught dromedary camel-bull at a village in Sokoto state, northwestern Nigeria, is presented. The 8-year old, 350 kg patient had a history of behavioural changes including decreased activity and feed intake. The patient worked in a neighboring wetland where it is frequently bitten by flies. During the first ambulatory visit the flies were sampled and identified. Further, clinical investigations revealed dullness, emaciation, tachypnea, tachycardia, pyrexia tick infestation. Laboratory examination of blood sample revealed macrocytic hypochromic anaemia, neutrophilic leucocytosis, regenerative moderate left shift and Tryanosoma evansi. Important ectoparasites found were Tabanus species and Hyalomma species. The camel responded to treatment with intravenous TRYPAMIDIUM-SAMORIN® (Isometamidium chloride hydrochloride powder 1 gm reconstituted in 50 ml of sterile water), subcutaneous 1% Ivermectin injections and topical ZEE-ON® (cypermethrin) spray. The client was advised to avoid keeping camels at the flies infested areas. It was concluded that surra should not be underestimated among the important diseases of dromedary camels in the semi arid rural settings of northern Nigeria. Relevant authorities should impose strong vector control programme to overcome the transmission of surra among humans and animals in Nigeria.

3.35

THE RELATIONSHIP BETWEEN ANEMIA, LIPID PROFILE, AND IRON IN CATTLE NATURALLY INFECTED WITH TRYPANOSOMES IN NIGER STATE NIGERIA

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ABSTRACT

Background: Trypanosomosis is an important disease of animals and humans, with significant impact on human development, food production, and economic growth in Africa. Trypanosomosis-related anaemia is characterized by erythrophagocytosis, acute hemolytic anaemia, and dyserythropoieses due to altered iron and lipid homeostasis and enormous iron utilization by trypanosomes. This study investigated the relationship between anaemia, lipid profiles, and iron in cattle under natural infection.

Methods: A cross-sectional study was conducted between December 2018 and January 2019 in Niger State, Nigeria. Giemsa-stained was used for parasite identification and PCV for anemia assessment. Serum iron and lipid profiles were measured and compared between the infected and uninfected cattle.

Results: Trypanosoma congolense, T. vivax, and T. brucei were identified as cause of bovine trypanosomosis. The mean PCV value for infected cattle was 23.27±6.82%, significantly ($p<0.05$) lower than 32.47±8.35% in the uninfected. The mean serum iron level of infected animals was 1.55±0.60mg/dL, significantly lower than 4.45±2.07mg/dL of uninfected. Mean cholesterol level of infected cattle was 2.25±1.66mg/dL which was significantly lower than that of the uninfected. The mean serum LDL-cholesterol was 2.57±0.78mg/dl in infected animals, which was significantly lower than 2.76±0.44mg/dl in the uninfected. Furthermore, the mean triglyceride level in the infected cattle was 3.2±1.08mg/dL, significantly higher than 1.90±0.58mg/dL in uninfected animals.

Conclusions: The study revealed marked anaemia, intertwined with metabolic pathways of iron and lipid fractions due to bovine trypanosomosis. Targeting

these metabolic pathways of blood stream trypanosomes could be novel therapeutic option in the fight against human and animal African trypanosomosis.

3.36

THE COMBAT PROJECT - CONTROLLING AND PROGRESSIVELY MINIMIZING THE BURDEN OF ANIMAL TRYPANOSOMOSIS

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African trypanosomosis affects both livestock and humans, with heavy socio-economic impacts in Africa. The disease is vector-borne, with transmission mainly carried out by tsetse but also by other biting flies. The animal form of the disease imposes a heavy burden on poor African livestock keepers, but it also occurs in Latin America and Asia, and incursions in mainland Europe have been reported. The human form of the disease, also known as sleeping sickness, is deadly, but with fewer than 1000 cases reported every year, the disease is presently targeted for elimination by the World Health Organization.

The ultimate goal of COMBAT is to alleviate the burden of animal trypanosomosis (AT) in Africa. The project builds on the progressive control pathway (PCP), a data-driven, step-wise approach to disease reduction and elimination. COMBAT aims to improve basic knowledge of disease transmission, develop improved control tools, strengthen surveillance, rationalize control strategies, develop capacities and raise awareness. Open questions on disease epidemiology, trypanotolerance, vector ecology and competence are being investigated. Innovative, eco-friendly vector control tools and more effective diagnostics are being developed. Spatial information systems on disease and vector distribution are being created to map disease risk in Africa and beyond. Surveillance is enhanced through information technology and strengthened reporting. The burden of the disease is being estimated at different levels, from continental to local. PCP-smart control strategies and roadmaps are in the development process at country level, and they will be informed by internationally agreed guidelines.

A crucial asset of the COMBAT project is its consortium, with 21 participants, both European and African research institutions, national veterinary authorities, a geographically-balanced representation across Africa, and international organizations. An authoritative External Advisory Board, a wide external network, and several regional activities will enhance the impacts of the project.

Keywords : Vector-borne Animal African Trypanosomosis; COMBAT; Horizon 2020; PCP

3.37

THE BENEFICIAL EFFECT OF ARGININE SUPPLEMENTATION ON TRYPANOSOMA BRUCEI BRUCEI INFECTED RATS

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ABSTRACT

The effects of arginine supplementation was investigated in Trypanosoma brucei brucei infected albino rats. Thirty-five (30) growing albino rats weighing 180-290 grams were used for this experiment. They were divided into five groups (A, B, C, D, E) of six rats each. Groups A, B and C rats were given 500mg, 1000mg, and 2000mg Arginine/ kg of their feed respectively from day 0. On day 21 on the supplementation (OTS), groups A, B, C and D were infected with 1 × 106 Trypanosoma brucei brucei intraperitoneally (IP). Group E served as uninfected unsupplemented group. The experiment was assessed by changes in body weight, packed cell volume (PCV), haemoglobin concentration (HB), red blood cell (RBC) count, total leucocyte count, differential leucocyte count, parasitaemia, antibody response and serum biochemistry. The supplementation led to significant ($P < 0.05$) decrease in parasitaemia level of the supplemented group. The antibody level, RBC, HB and PCV improved in the supplemented group when compared with the infected unsupplemented group. Also, the total leucocyte and differential leucocyte count improved in the supplemented group. The SGOT and SGPT was significantly lower in the supplemented group when compared with the infected unsupplemented group. The mean creatinine and urea level were not significantly ($P > 0.05$) affected. The result is indicative of the fact that arginine may be beneficial in the management of African trypanosomosis.

3.38

INVESTIGATION OF THE ANTITRYPANOSOMAL POTENCY OF CHEMICAL CONSTITUENTS FROM TERMINALIA GLAUCESCENS (COMBRETACEAE))

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Objective: Treatments used for animal trypanosomiasis control have shown a number of drawbacks including toxicity, spreading development of resistant trypanosomes, making urgent the need to search for new active and non-toxic molecules. This study provides a detailed approach of the antitrypanosomal investigation of chemical constituents from Terminalia glaucescens' hydroethanolic stem bark extract. Materials and methods: The crude extract, fractions and sub-fractions from Terminalia glaucescens stem bark were tested in culture for antitrypanosomal potency and cytotoxicity using Trypanosoma brucei brucei parasites, Vero cells line and the resazurin-based cell viability assay. Metabolites from the most active and selective sub-fraction were identified using the molecular networking approach through the Global natural products molecular networking platform (GNPS). Results: This investigation led to the identification of an active and highly selective sub-fraction, Tg n-but-2 (IC50: 0.87 µg/ml and selectivity index >45.95). Molecular networking analysis disclosed the presence of several terpenoids and flavonoids among which the common Cirsiliol, identified for the first time in this genus. Discussion: Cirsiliol might contribute to this activity through the inhibition of enzyme tyrosine kinase of trypanosomes which is involved in regulating their proliferation. Conclusion: The sub-fraction Tg n-but-2 qualifies as a promising starting point for the characterization of a novel antitrypanosomal chemical scaffolds.

Keywords: Terminalia glaucescens, Antitrypanosomal activity, Selectivity, Tg n-but-2, Cirsiliol, Inhibition kinetics

3.39

POTENTIAL MECHANICAL VECTORS OF TRYPANOSOMA EVANSI IN THE CANARY ISLANDS, SPAIN

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Mechanical transmission by hematophagous insects, mainly large dipterans, is the main mode of transmission of African trypanosomes in herbivores out of Africa (Desquesnes et al., 2013). Trypanosoma evansi was detected in a dromedary camel in the Canary Islands (Spain) in 1997 (Gutiérrez et al., 1998). Few studies have been completed on its vectors in Spain, however, Stomoxys calcitrans was considered as responsible for the transmission of T. evansi in an affected area of the island of Gran Canaria (Rodríguez et al. 2014). Within the framework of the COMBAT project, a study of the possible vectors of Trypanosomes in the Canary Islands has been implemented. During 7 days every three months for 1 year, two models of traps, Vavoua and NZI (ZeroFly®), were used for sampling vectors in the islands of Gran Canaria (5 locations, 15 traps), Lanzarote (3 locations, 9 traps) and Fuerteventura (2 locations, 6 traps) according to geoclimatic and farm locations. Insects caught were identified and postprandial individuals were kept for subsequent DNA analysis, through metabarcoding (MBC). A total of 17,077 S. calcitrans (3,359 in Lanzarote, 5,539 in Fuerteventura and 8,179 in Gran Canaria), 1 Tabanus cordiger (in Fuerteventura), 25 Pseudolynchia canariensis (16 in Gran Canaria, 8 in Fuerteventura and 1 in Lanzarote) and 16,911 individuals of the genus Musca (3,250 in Fuerteventura, 3,403 in Gran Canaria and 10,258 in Lanzarote) have been trapped. In addition, approximately 40 postprandial insects from different locations have been stored for further DNA analysis in MBC. Results confirm the major role S. calcitrans could play in the transmission of T. evansi; the potential role of other species such as T. cordiger and P. canariensis would require further sampling and blood meal analyses to confirm this hypothesis.

GLOSSINA BIOLOGY, CONTROL AND ERADICATION

4.01

POPULATION GENETICS OF GLOSSINA FUSCIPES FUSCIPES FROM SOUTHERN CHAD

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Abstract

In Subsaharan Africa, tsetse flies are vectors of trypanosomes causing Human African Trypanosomiasis (HAT) and Animal African Trypanosomosis (AAT). Some foci of HAT persist in Southern Chad, where a program of tsetse control was started against the local vector Glossina fuscipes fuscipes in the Mandoul focus in 2014, and in Maro in 2018. Flies were also sampled in 2018 in Timbéri and Dokoutou. We analyzed the population genetics of G. fuscipes fuscipes from the four tsetse-infested zones. The trapping samples were characterized by a strong female biased sex-ratio, except in Timbéri and Dokoutou that had high tsetse densities. Average dispersal distance (within the spatial scale of each zone) was as large as or larger than the total length of each respective zone. The genetic signature of a population bottleneck was found in the Mandoul and Timbéri area, suggesting a large ancient interconnected metapopulation that underwent genetic subdivision into small, isolated pockets due to adverse environmental conditions. Long range dispersal abilities and the presence of genetic outliers suggest a possibility of migration from remote sites such as the Central African

Republic in the south (although the fly situation remains unknown there) and/or a genetic signature of recent exchanges. Due to likely isolation, an eradication strategy may be considered for sustainable HAT control in Mandoul focus. Another strategy will probably be required in Maro focus, which probably experiences much more exchanges with its neighbors.

KeyWords: Tsetse flies, Dispersal, Trypanosomosis, Control.

4.02

PUTATIVE VERTEBRATE HOST PREFERENCES OF GLOSSINA AUSTENI AND GLOSSINA PALLIDIPES TSETSE FLIES IN KILIFI AND KWALE COUNTIES, KENYA

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Odors from Glossina austeni and Glossina pallidipes preferred and/or non-preferred vertebrate hosts can be exploited in research and development of attractants or repellents of the flies for protection of humans and domestic animals against G. austeni or improvement of existing attractant blends for G. pallidipes. We Sampled fed flies and analyzed vertebrate blood meal sources of both fly species at Arabuko Sokoke National Reserve (ASNR) and Shimba Hills National Reserve (SHNR), Kenya, to determine their putative preferred hosts, hence potential source of G. austeni or G. pallidipes specific odors. We collected 398 and 204 sympatric G. pallidipes and G. austeni with bloodmeal, respectively, in SHNR and 50 fed G. austeni flies in ASNR in 2022. We extracted bloodmeal DNA and characterized them using high-resolution melting (HRM) vertebrate 16S rRNA-PCR. We identified harnessed bushbuck, buffalo, common warthog, cattle, suni antelope and bush pig putative host bloodmeals in SHNR. We similarly detected suni antelope, harnessed bushbuck, African buffalo and cattle bloodmeals from ASNR. The vertebrate bloodmeal sources were significantly different by tsetse fly species ($\square^2 = 43.215$, $p < 0.001$). The proportion of common warthog bloodmeals was higher in G. pallidipes while that of suni antelope and harnessed bushbuck was higher in G. austeni. The identified preferred vertebrate hosts by G. pallidipes (Common warthog) and G. austeni (suni antelope and harnessed bushbuck) reveal that odors from these vertebrates can be harnessed and formulated into novel tsetse attractants for respective species for use in their routine control.

Key words: Sympatric tsetse population, bloodmeal, hosts, Glossina pallidipes, Glossina austeni, tsetse fly

4.03

AUTOMATED TSETSE PUPAE SEX SORTING BY UTILISING NEAR-INFRARED IMAGING

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The principal method of sex separation of tsetse flies is by visual identification of the male hypopygium, the modified 9th abdominal segment bearing the external genital structures. In mass-rearing facilities, manual sex-sorting of immobilized chilled tsetse adults is a labour-intensive and time-consuming activity that can take up to 23% of the time invested in these colonies; therefore attempts have been made to develop automatic sex-separating systems of tsetse pupae. It is well known that female adult pharates inside the pupae melanise 1-2 days earlier than in males. This melanisation can be detected by infrared cameras through the pupa shell. The newly developed Near Infrared Pupae Sex-Sorter (NIRPSS) uses an image analysis algorithm to identify this melanisation process inside the pupae shell. When the pupae are matured at a constant temperature of 24 □ and sorted at the appropriate age, the sorting machine can efficiently separate the sexes. We demonstrated that pupae of G. p. gambiensis can be sex-sorted by assessing the melanisation status of 24 day old pupae through image analysis under near infrared light. This method can potentially and significantly reduce the workload at tsetse insectaries by simplifying the rearing procedures, resulting in lower production costs. This sex-sorting procedure with NIRPSS can also be adapted to other tsetse species and adjusted to specific rearing conditions as found in different laboratories.

4.04

GAMMA-RADIATION OF GLOSSINA PALPALIS GAMBIENSIS REVISITED: EFFECT ON FERTILITY AND MATING COMPETITIVENESS

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African animal trypanosomoses are vector-borne diseases that cause enormous livestock losses in sub- Saharan Africa, with drastic socio-economic impacts. Vector control in the context of an area-wide integrated pest management program with a sterile insect technique component requires the production of high-quality sterile male tsetse flies. In our study, we evaluated the effect of irradiation on the fecundity of Glossina palpalis gambiensis to identify the optimal dose that will induce maximum sterility while maintaining biological performance. In addition, male mating performance was evaluated in semi-field cages. The irradiation doses used were 90, 100, 110, 120, 130, 140 and 150 Gy. The results showed that pupal production and emergence rates were higher in batches of females that had mated with fertile males than in those that had mated with irradiated males with any experimental dose. A dose of 120 Gy administered to male flies induced 97–99% sterility after mating with

virgin females. For the semi-field cage experiments, males irradiated with 120 Gy showed good sexual competitiveness as compared to fertile males and those irradiated with 140 Gy, considering the level of filling of spermatheca and the number of pairs formed. The optimal radiation dose of 120 Gy found in this study is slightly different from the traditional dose of 110 Gy that has been used in several eradication programmes in the past. The potential reasons for this difference are discussed, and an argument is made for the inclusion of reliable dosimetry systems in these types of studies.

Key words: tsetse flies, sterile insect technique, mating performance, radiation dose.

4.05

FINDING SOURCES OF RE-INFESTATION: SPATIAL SCALE OF GENETIC CONNECTIVITY OF TSETSE POPULATIONS ALONG THE UGANDAN AND KENYAN SHORE OF LAKE VICTORIA

Bateta Rosemary

ABSTRACT

Glossina fuscipes fuscipes is the primary vector of human African trypanosomiasis in Uganda and western Kenya. Concerns over the long-term efficacy of vector control programs have been raised due to re-emergence of tsetse fly populations following eradication efforts. In order to develop improved vector control strategies, it is essential to characterize the genetic connectivity among tsetse populations and thus identify potential sources of tsetse re-infestation. We used 16 microsatellite loci and 450 bp of mitochondrial DNA sequence to examine genetic diversity and connectivity in 20 sampling sites on the shores of Lake Victoria. We found evidence for six genetic regions and evidence of long-distance dispersal of up to 50 km, possibly indicating passive dispersal of adult flies. There were contrasting patterns of genetic diversity between the mtDNA and nuclear markers, with mtDNA indicating uniform diversity and microsatellites indicating high genetic diversity in sites located at the center of the sampled region near Buvuma Island in Uganda. This contrasting pattern of diversity in mtDNA versus microsatellites could have been caused by genetic admixture of recently diverged lineages, which would affect the quickly evolving nuclear markers, but not the more slowly evolving mitochondrial marker. We also found high estimates of relatedness, however, there was strong evidence that these estimates reflect inbreeding and small effective population sizes rather than close familial relationships. Findings suggest ongoing genetic admixture and infrequent long-distance dispersal, underscoring the need for sustained tsetse surveillance and international coordination to reduce re-emergence of tsetse populations after local eradication.

4.06

ORAL PRESENTATION
POPULATION STRUCTURE AND GENETIC DIVERSITY OF GLOSSINA OF THE PALPALIS GROUP FROM CONGO: THE CHALLENGES FOR CONTROL STRATEGIES

Abraham Mayoke, Johnson O. Ouma , Paul O. Mireji, Stephen F. Omondi, Shadrack M. Muya, Andre Itoua, Sylvance O. Okoth , and Rosemary Bateta

ABSTRACT

Tsetse flies of the palpalis group, particularly Glossina fuscipes, are the main vectors of human African trypanosomiasis or sleeping sickness in Congo-Brazzaville. They transmit the deadly human parasite, Trypanosoma brucei gambiense and other trypanosomes that cause animal trypanosomiasis. Knowledge on diversity, population structure, population size, and gene flow is a prerequisite for designing effective tsetse control strategies. There is limited published information on these parameters including migration patterns of G. fuscipes in Congo-Brazzaville. We genotyped 288 samples of G. fuscipes from Bomassa (BMSA), Bouemba (BEMB), and Talangai (TLG) locations at 10 microsatellite loci and determined levels of genetic diversity, differentiation, structuring, and gene flow among populations. We observed high genetic diversity in all three localities. Mean expected heterozygosity was 0.77 ± 0.04, and mean allelic richness was 11.2 ± 1.35. Deficiency of heterozygosity was observed in all populations with positive and significant FIS values (0.077–0.149). Structure analysis revealed three clusters with genetic admixtures, evidence of closely related but potentially different taxa within G. fuscipes. Genetic differentiation indices were low but significant (F_{ST} = 0.049, $P < 0.05$), indicating ongoing gene flow countered with a stronger force of drift. We recorded significant migration from all the three populations, suggesting exchange of genetic information between and among locations. Ne estimates revealed high and infinite population sizes in BEMB and TLG. These critical factors should be considered when planning area-wide tsetse control interventions in the country to prevent resurgence of tsetse from relict populations and/or reinvasion of cleared habitats.

Keywords: Microsatellites, Glossina fuscipes, Gene flow, migration, population size.

4.07

TSETSE TRANSMITTED TRYPANOSOMES: FROM THE SKIN TO A SYSTEMIC INFECTION

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Following an infectious bite, inoculated metacyclic trypanosomes establish a local infection and continue a journey to systemic colonization. Making use of the tsetse fly vector, in vivo imaging, immune-deficient mouse models and immunological cell profiling, we explored the role of innate immune responses. Despite the armory of recruited anti-pathogen effector functions, parasites escape immune elimination and prominently distribute to tissues such as adipose, spleen and lungs. The host immune system must maintain a delicate balance between mounting an effective immune response and limiting collateral damage. Our studies have contributed to the characterization of parasitic proteins with IL-10 inducing capacity promoting early trypanosome outgrowth in the host. Their pivotal role was illustrated by the reduced parasitemia and prolonged host survival upon gene disruption. Besides IL-10, interest has increased in the contribution of IL-27 as an alternative immune-modulating cytokine to control hyperactivation of IFN-□ secreting CD4+ Th1 cells. Myeloid cells, such as monocytes and neutrophils, were identified as early sources of IL-27 in skin, blood, liver and spleen of infected mice. Pharmacological inhibition and genetic IL-27-deficient models demonstrated an unexpectedly strong impact on both parasitemia and pathogenicity. Collectively, both IL-10 and IL-27 have been identified as pivotal cytokines triggered by tsetse transmitted trypanosomes, underlying successful establishment while limiting pathology. The discovery of asymptomatic colonization of the skin and lungs as tissue reservoirs pinpoints future challenges for disease control, but also offers opportunities for the development of novel non-invasive diagnostic tests.

4.08

ORAL COMMUNICATION
EFFECTS OF OXYTETRACYCLINE AND PENICILLIN/ STREPTOMYCIN ON THE SURVIVAL AND PUPAE PRODUCTION IN GLOSSINA PALPALIS GAMBIENSIS (DIPTERA: GLOSSINIDAE)

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Abstract

The objective of this study was to assess the survival/mortality and fecundity of a laboratory colony of Glossina palpalis gambiensis exposed to the in vivo residual effects of Tenalin (Oxytetracycline 20%) and PenStrep (Penicillin/Streptomycin: Procaine penicillin G 200000 IU and Dihydrostreptomycin sulphate 200 mg), which are the two most commonly used commercial antibiotics for treating cattle in Burkina Faso. Two groups, each consisting of four rats with one control rat per group, were administered a single intramuscular dose of 83.33 mg/kg body weight (Penicillin/Streptomycin), 0.035 mg/kg body weight (Oxytetracycline), and 0.9% saline water (control), respectively. Each treated rat was used to feed 25 teneral female flies at 24 hours, 7 days, 14 days, and 28 days following the treatment. After the initial blood meal from the animals, the flies were subsequently fed from the second day onwards on an artificial membrane for 60 days. Throughout this period, mortality and deposited pupae were recorded, including their respective weights. The Log-rank (Mantel-Cox) test was used to compare the survival curves (15th day) of the Tsetse flies. The residual effect of the two antibiotics at 24 hours post-treatment exhibited beneficial effects on the flies in the Penicillin/Streptomycin treatment group, resulting in a significant improvement in both survival (Chi-square: 11.82, p-value: 0.0006, compared to Oxytetracycline: Chi-square: 0.181, p-value: 0.670) and the number of pupae per initial female. On the other hand, the blood meal on animals at 7 days post-treatment with Oxytetracycline significantly affected the survival of the flies (Chi-square: 9.477, p-value: 0.0021, compared to Penicillin/Streptomycin: Chi-

square: 0.863, p-value: 0.352), suggesting the involvement of the insecticidal effect of Oxytetracycline's secondary metabolites. Our findings imply that for Glossina insectaries, biological tests should be conducted on blood collected from the abattoir before using it to feed the Glossina colony.

Keywords: Penicillin/Streptomycin, Oxytetracycline, residual effects, metabolites, Tsetse flies

4.09

ORAL PRESENTATION
PHYLOGENETIC RELATIONSHIP AND DIVERSITY OF GLOSSINA OF THE PALPALIS GROUP FROM CONGO: THE CHALLENGES FOR CONTROL STRATEGIES

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ABSTRACT

Despite the morphological characterization established in the 1950s and 1960s, the identity of extant taxa that make up Glossina fuscipes (s.l.) in the Congo remains questionable. Whereas the characterization of Glossina palpalis is consistent with the long-held view in the country that is found in the South of Congo. Previous claims of overlap between G. fuscipes (believed to be G. f. quanzensis) and G. palpalis palpalis around Brazzaville city further complicate the taxonomic status and population dynamics of the two taxa. This study aimed to determine the phylogenetic relationships between G. fuscipes and G. palpalis and to assess genetic variation among G. fuscipes (s.l.) populations in Congo Brazzaville. A total of 263 G. fuscipes (s.l.) from northern and central regions, and 65 G. p. palpalis from southern part of the country were collected. The mitochondrial cytochrome c oxidase subunit I (cox1) gene was amplified using taxa-specific primer pairs. Sequence data analyses were done in DnaSP and Arlequin to assess the genetic diversity, differentiation and demographic history of G. fuscipes (s.l.) populations. The Glossina fuscipes (s.l.) populations showed high haplotype diversity (H = 46, Hd = 0.884), moderate nucleotide diversity (π= 0.012) and moderate (FST = 0.072) to high (FST = 0.152) genetic diferentiation. Most of the genetic variation (89.73%) was maintained within populations. The mismatch analysis and neutrality tests indicated recent tsetse population expansions. The molecular characterization using PCR & sequencing followed by BLASTn analysis, showed that only BEMB (Bouemba) population shared 100% homology with known Gff from Uganda whereas samples from Bomassa (BMSA) and Talangai (TLG) showed 98.95% and 98.6% homologies, respectively to the same Gff. Based on the insistence of reviewers, we only considered the BEMB population with 100% homology to Gff was actually Gff and that BMSA and TLG were most likely inhabited by a species complex (possibly comprising of Gff, Gfq and Gfm), hence the use of G. fuscipes (s.l.) adopted throughout. Phylogenetic analysis revealed minor differences between G. fuscipes (s.l.) and G. p. palpalis. Genetic differentiation ranged from moderate to high among subpopulations. There was a restricted gene fow between G. fuscipes (s.l.) populations in the North and central part of the country. Genetic

signatures based on cox1 showed recent expansion and recovery of G. fuscipes (s.l.) populations from previous bottlenecks. To fully understand the species distribution limits, we recommended further studies involving more widespread sampling and high throughput sequencing to more authentically characterize the palpalis group tsetse flies in Congo Brazzaville.

Keywords: Glossina palpalis, Glossina fuscipes, Taxonomy, Genetic diversity, Cytochrome c oxidase, mtDNA, Phylogeny

4.10

IDENTIFICATION OF CAMEROONIAN TSETSE FLY SPECIES BASED ON MORPHOLOGICAL CHARACTERS AND NUCLEAR INTERNAL TRANSCRIBED SPACER 1 SEQUENCE POLYMORPHISM: IMPORTANCE IN PLANNING EFFICIENT VECTOR CONTROL

Feudjio Soffack Steve

Summary

Tsetse fly species identification and mapping is a key prerequisite for any successful vector control strategy against Human African Trypanosomiasis and Animal African Trypanosomiasis. In this work, we updated the tsetse species identification and repartition in geographical areas in Cameroon. Tsetse flies were captured from different localities and their species were identified with morphologic cues. DNA was then extracted from their legs and the Internal Transcribed Spacer-1 (ITS1) region was amplified with PCR. Amplification products were verified on polyacrylamide gels and subjected to Sanger sequencing. DNA sequences were analysed and compared to existing ones in GenBank, for formal identification and to establish their phylogenetic relationships. Morphologic features allowed to distinguish Glossina palpalis palpalis, G. pallicera, G. caliginea, and G. nigrofusca in Southern area, G. morsitans submorsitans in Northern area but not G. palpalis palpalis, G. tachinoides and G. fuscipes in Northern area. The ITS1 length polymorphism was high among most of the studied species and allowed to identify each of its i.e., G. palpalis palpalis with 241 and 242 bp and G. tachinoides with 221 and 222 bp, G. fuscipes with 236 and 237 bp G. tachinoides with 221 and 222 pb. G. palpalis palpalis instead of G. fuscipes was highlighted in Mbakaou-Cameroon and G. palpalis gambiensis identified among G. tachinoides samples from Burkina Faso, received as outgroup. This study confirms the presence of Glossina palpalis palpalis in the Northern area of Cameroon and suggests the use of ITS1 marker to confirm the identification of Glossina taxa.

4.11

SEX BIAS OF GLOSSINA MORSITANS CAUGHT IN BAITED NG2G TRAPS IN KIDEPO VALLEY NATONAL PARK, UGANDA

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Abstract

The tsetse flies Glossina morsitans is the chief vector of all forms of African Animal trypanosomiasis found in Northwest Uganda where it impacts on susceptible wildlife in the Kidepo Valley National park and livestock is surrounding farmlands. Tsetse control must therefore be an integral part of trypanosomiasis management especially of susceptible wildlife in conservation areas. The success of the tsetse intervention relies on knowledge of precise information about the dynamics, behaviour and ecology of the precise tsetse species. Such studies rely on the ability to catch the tsetse species in baited traps. The Uganda Government desires to enhance the conservation efforts at Kidepo National Park, including mitigating trypanosomiasis challenge among susceptible wildlife. A rapid appraisal of tsetse distribution and abundance was carried out in Narus Valley of Kidepo National Park in July 2022 using NG2G tsetse traps baited with acetone and standard phenols. The traps were deployed in twenty georeferenced positions in the open grasslands and thicketed woodlands. Twenty-four-hour trap catches of the tsetse flies were obtained over two consecutive days. Catch was sorted out by number, sex and trap position. Mean trap was determined for every trap as well as the apparent density of all trap catches. A total of 2575 flies, all belonging to the genus Glossina morstans were caught in the traps. Over 75% of trap catch were females, thus indicating a sex bias in favour of females. In the individual traps, the catch bias for females ranged from 50% in mean catches lower than 10 flies per trap per day to 80% for trap catches of higher densities. Tsetse densities exist in the field in equal sex – ratios and that the flies are available to traps in the same proportions. The present study indicates a sex – biased trap entry behaviour with a strong preference for sampling females by the NG2G trap, and which may also be directly density dependent. This trap type would therefore be appropriate for tsetse population intervention through removal trapping.

Key words: tsetse flies, trap catches, sex ratios, Glossina morsitans, Narus Valley

4.12

NOVEL TSETSE FLY REPELLENT FOR CONTROL OF SAVANNAH TSETSE FLY IN EAST AFRICA

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Tsetse fly - transmitted Human African Trypanosomiasis (HAT) and Animal African Trypanosomiasis (AAT) are among most neglected tropical diseases in sub-Sahara Africa. Tsetse fly control strategies constitute cornerstones efforts in suppression and eradication of HAT and AAT. Tsetse fly repellents that minimize contact between infective flies and their vertebrate hosts can augment the strategies. We formulated a Novel Repellent Blend (NRB) (□-nonalactone, heptanoic acid, 4-methylguaiacol and geranyl acetone) based on tsetse-refractory waterbuck odor constituents and their structural analogues. Using two-choice wind tunnel in the laboratory and Latin square experimental design in the field, we establish that NRB is two-folds more efficacious than current commercial repellent blend against most savannah species. We microencapsulated the optimized NRB into □-cyclodextrin nano particles by kneading technique, evaluated responses of G. pallidipes tsetse to the microencapsulated blend and established kinetic release rates from the microcapsules under field conditions. We established significantly ($p<0.05$) lower release rate (5.35mg/h) in microencapsulated blend than the un-encapsulated control (11.82 mg/h) and that the micro-capsulation did not significantly affect responses of the tsetse flies to traps. We assessed efficacy of NRB in livestock protection using randomized block experimental design and established at least 95% repellence of G. pallidipes from oxen by NRB. We successfully masked the NRB in fragrance for odor appeal (for potential use in security and hospitality industries) and are developing NRB into semiochemical prototypes for integrated push–pull deployment in areawide control of tsetse flies in Eastern Africa.

4.13

ELIMINATION OF GLOSSINA PALPALIS GAMBIENSIS FROM THE NIAYES AREA OF SENEGAL, A DREAM THAT BECAME TRUE: IMPACT ON THE EPIDEMIOLOGY OF AFRICAN ANIMAL TRYPANOSOMOSIS

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Senegal launched a national control program against tsetse and trypanosomosis in 2006. This programme, subdivided in three phases (Niayes, Sine-Saloum and Casamance, respectively), started in the Niayes area that covers 7,350km2 including 1,375km2 previously infested with Glossina palpalis gambiensis Vanderplank (Diptera : Glossinidae), the cyclical vector of African animal trypanosomosis (AAT), and the main hindrance to the development of productive livestock in the area.

To overcome this constraint, an area-wide integrated pest management (AW-IPM) project combining chemical control and the Sterile Insect Technique (SIT) was launched in 2006 to eradicate the tsetse population. The project was implemented following a phased conditional approach and the target area was subdivided into three blocks that had to be treated sequentially. During the suppression phase, more than 3 000 deltamethrin impregnated traps were deployed, 2,970 cattle were treated with pour-on formulations of insecticides and targeted suitable habitats were sprayed from the ground or by drone in areas that had recurrent resilient tsetse fly pockets.

In the eradication phase, more than 10 million sterile males were released by air and from the ground. In parallel, a yearly monitoring of the serological and

parasitological prevalence was implemented in the control blocks to measure the impact of the campaign on the disease.

The entomological monitoring implemented in the 3 blocks showed that no wild fly has been caught since January 2022 in the target area. Also, the serological and parasitological prevalence of the disease indicated the absence of the disease since 2017 in block 1 and 2021 in block 2, respectively. These results suggest a strong probability that the population of Glossina p. gambiensis has been eradicated from the Niayes area. They show the efficiency of the AW approach and that AAT can be sustainably eliminated by creating an area free from G. p. gambiensis.

The elimination of the tsetse fly and AAT allowed the introduction of approximatively 10,000 exotic cattle between 2017 and 2021. As a consequence, milk production increased by 14.5 million litres.

4.14

MAPPING THE PROGRESSIVE CONTROL PATHWAY FOR AFRICAN ANIMAL TRYPANOSOMOSIS IN BURKINA FASO

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Abstract

In 2007–2013 Burkina Faso carried out large scale interventions in an area of approximately 53,000 km2 (19.31% of the country) in the framework of the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC). Free areas could not be created, but tsetse densities were substantially reduced, with an alleviation of the burden of African animal trypanosomosis (AAT). In this study we mapped the past and current status of Burkina Faso in the progressive control pathway (PCP) for AAT. First, we collected new epidemiological data to fill geographical gaps in a recently developed national atlas of tsetse and AAT. Second, we collated all data on control activities over the past 15 years. Finally, we combined the epidemiological and control data to map the changing status of the different areas in Burkina Faso within the PCP. The PATTEC area could be considered at stage 3 for the duration of the elimination project; after this failed, the area receded to stage 2, as control operation were sustained for some time (2 years). However, these operations failed the sustainability test, and were discontinued, thus ultimately bringing back the area to stage 1. As of 2022, the country can be considered in stage 1 (i.e. no control activates), with some areas (56.56% of the country) in stage 1 – advanced (i.e. basic epidemiological information for decision making available), and others (43.44% of the country) in stage 1 – early (i.e. epidemiological information unavailable).

Key words: PCP stage, tsetse, Trypanosomosis, mapped

4.15

PARASITOLOGICAL AND ENTOMOLOGICAL LARGE-SCALE FIELD SURVEY ON THE ADAMAOUA PLATEAU IN CAMEROON: 20 YEARS AFTER A TITANESS AERIAL SPRAYING TSETSE ERADICATION CAMPAIGN

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Twenty (20) years after a titaness aerial spraying tsetse eradication campaign to completely clear tsetse flies from the Adamaoua plateau in Cameroon, a random parasitological and entomological large-scale field survey was carry out in raining season from June to September 2022 on the plateau, the supposed tsetse-free buffer zone and the tsetse-infested valley.

The parasitological results of this large scale cross-sectional study (785 sampling cattle's) showed that the average tryppanosomosis prevalence in cattle in the region was close to 37.5% with a high predominance of Trypanosoma congolence infections. Moreover, between zones the prevalence did not differed significantly. It was slowly high in the tsetse-infested zone (39.4%) and acceptable in the buffer zone and the plateau (36.7% and 36.5% respectively).

Furthermore, tsetse flies (Glossina morsitans submorsitans) were overall predominant and the apparent density was not significantly different from zones. It was slightly higher 10.8 flies/trap/day in the tsetse infested area and understandable in the buffer zone and the plateau (8.2 flies/trap/day and 7.6 flies/trap/day respectively).

Result from this large-scale field survey clearly indicated that: trypanosomosis challenge is reel on the Adamaoua plateau and that actions taken to prevent re-invasion of tsetse from the infested valley to the plateau 20 years ago are obsoletes today; and also that new approaches and strategies to control tsetse in herds and slow down the speed of the plateau re-invasion are urgently needed. Probably, environmental friendly tsetse repellent collars technology could be one way out in Cameroon.

Key words: Tsetse control, Trypanosomosis, Parasitology, Entomology, repellent, Cameroon

4.16

INTEGRATION OF TSETSE FLY AND TRYPANOSOMIASIS CONTROL METHODS FROM LIVESTOCK FARMERS' PERSPECTIVE: A MULTIVARIATE PROBIT APPROACH

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Abstract

Integration of tsetse fly and trypanosomiasis control methods is identified as most feasible and effective approach to eradication of African Animal Trypanosomiasis (AAT) and Human African Trypanosomiasis (HAT). However, little focus is directed towards understanding the drivers of integration of the control methods by farmers. We used cross-sectional data collected from 536 livestock keeping households in Lamu County of Kenya to identify factors influencing multiple use of insecticide treated livestock (ITL), insecticide treated targets (ITT), and treatment with trypanocidal drugs (TTD). Multivariate probit model was applied in estimation of covariates of multiple use of the control methods. Descriptive results indicated that nearly 61% of the livestock keeping households used at least one of the tsetse fly and trypanosomiasis control methods, with about 9%, 7%, and 13% of the households using ITL, ITT, and TTD respectively. The results also indicated that nearly 32% of the households integrated the control methods. Furthermore, multivariate probit results showed that sex of household head, age of farmer, positive perceptions of technology availability and effectiveness, and off-farm income increased the likelihood of integration. In contrast, household size, having agriculture as the main occupation, and cost of the technology significantly reduced the likelihood of multiple use of the control methods. The results suggest heterogeneity in farmers' decisions to integrate tsetse fly and trypanosomiasis control methods. Therefore, farmer outreach programs should consider key household characteristics, as well as technological attributes which may stimulate adoption of appropriate tsetse fly and trypanosomiasis control technologies.

Key Words: control method, farmers' perspective, multivariate probit, trypanosomiasis, tsetse fly

4.17

THE 'GRÉOUNO MODEL' CROSS-SCREENS, AN IMPROVEMENT ADAPTED TO THE GUINEAN MANGROVE AREA FOR GLOSSINA PALPALPALIS GAMBIENSIS VECTOR CONTROL

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Abstract

In the mangrove area in Guinea, where Human African Trypanosomiasis active foci are located, tsetse vector control through the use of reduced screens has been in place since 2012. Despite their effectiveness, their impact appears to be waning in some areas. Therefore, a new three-dimensional model - 'cross-screen' (écran croisé) was evaluated to address this situation. Our study first compared the effectiveness of four trap models: the reduced screen (ER: écran réduit), the cross screen (EC: écran croisé), the biconical trap (PB: piège biconique), and the pyramidal trap (PP: piège pyramidal). Tsetse densities were evaluated using the Latin square design. In a first experiment, 998 tsetse were captured by all models, including 213 tstetse by ER (21%), 419 by EC (42%), 240 by PB (24%) and 126 by PP (13%). To confirm EC efficiency, a second experiment was conducted to compare EC and ER only. Cross-screens captured significantly more tsetse than ERs (844 vs 367 tsetse). We then assessed EC vs ER in the context of vector control. After one year, a reduction of 59.8% in EC channels was recorded compared to 11.9% in ER channels. We also found that after one year, 59.4% of ERs were dysfunctional compared to only 9.1% of ECs. This study showed that EC was more effective and resistant than ER and suggests that it is a relevant tool in vector control in mangrove HAT foci.

Keywords: Glossina palpalis gambiensis, cross screen, reduced screen, efficiency, mangrove

4.18

TACKLING TSETSE: SPATIAL-TEMPORAL INSIGHTS FOR TIMELY AND TARGETED CONTROL

Stella Gachoki

Tsetse flies are a major threat to human and livestock health in Sub-Saharan Africa, where they transmit human and animal African Trypanosomiasis (AT). Unfortunately, there is currently no available vaccine for either human African trypanosomiasis (HAT) or animal African trypanosomiasis (AAT). Therefore, the most promising strategy to combat these diseases is to reduce tsetse fly populations to levels that prevent disease transmission. While tsetse control strategies have been extensively studied and documented, their implementation in many regions is severely impeded by the lack of precise and reliable information regarding tsetse habitats and abundance. To address this crucial knowledge gap and assist decision-makers in effectively targeting tsetse control interventions, our research focuses on three primary goals. In our first goal, we innovatively used newly emerged tsetse flies without blood meals as indicators of breeding sites (https://doi.org/10.1186/s13071-021-05017-5). Our second goal was to determine if satellite-derived environmental factors and weather data can be used to explain the abundance of G. pallidipes around the Shimba Hills National Reserve.We found that tsetse numbers were always high with 1km of the reserve outer boundary but beyond that distance tsetse number rose after a month of increased rainfall but if rainfall persisted beyond a month they started to decline (https://doi.org/10.1371/journal.pntd.0011398). In our third goal, we aimed to transfer tsetse habitat models from Shimba Hills National Reserve (SHNR) to Nguruman Conservancy, Ruma and Akagera National Park. Preliminary results indicate that the transfer to dissimilar areas (Nguruman during the dry season) was unsuccessful. However, in areas with some environmental similarity (Akagera and Ruma National Parks, and Nguruman in the wet season) , the predictions yielded satisfactory results (F1 score = ~0.7). Ultimately, our research findings will provide decision-makers with valuable information for informed decision-making and efficient resource allocation.

4.19

TRYPANOSOME INDUCED METABOLITES AS POTENT ATTRACTANTS FOR GLOSSINA PALLIDIPES.

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Animal African Trypanosomiasis (AAT) transmitted mainly by tsetse flies, is still the major constraint to livestock production in Sub-Saharan Africa despite various control efforts. Trypanosome-induced semiochemicals found in urine of infected cattle are predictive AAT biomarkers with potential for use as baits for tsetse flies. This study aimed to investigate the response of G. pallidipes to trypanosome-induced semiochemicals from urine of T. congolense infected cow as potential baits to G. pallidipes with an economical dispenser for field application. Coupled Gas Chromatography-Mass Spectrometry (GC-MS) was used to analyze volatile organic compounds of cow urine odor profiles to identify trypanosome-induced semiochemicals. The flies' response to the selected semiochemicals was conducted using bioassays in the laboratory and field comparing the baited trap catches against the negative and positive controls. Urine of trypanosome infected cow attracted significantly more flies in both laboratory (ttest= 3.15, p=0.003) and field experiments (t-test=3.15, p=0.003). Dihydro-□-ionone and 3- ethylphenol attracted significantly more G. pallidipes compared to negative control, (dihydro-□- ionone, p=0.04, and 3-ethylphenol, p=0.02). Three semiochemical blends (NB1, NB2 & NB3) attracted more G. pallidipes compared to positive and negative control using liquid dispensers (ttest, p= 0.0014, p= 0.0006, and p= 0.0163 respectively). There was no significant difference between G. pallidipes catches using dry and liquid formulation dispensers (p=0.7257). Blend NB1 attracted significantly more blood-fed G. pallidipes compared to negative control (Fisher Exact Test, p=0.0001). Trypanosome-induced semiochemicals demonstrates their ability as potent attractants for G. pallidipes. The results of this study are vital for developing new tsetse control strategies using effective attractants.

4.20

THE FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA, NEEDS SURVEILLANCE PROCEDURES AND MAPPING OUT OF THE TRYPANOSOMIASIS AND TSETSE FLIES IMPACTED COMMUNITY

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The parasite condition known as sleeping sickness and human African trypanosomiasis. Which tsetse fly species are present in Nigeria, the Glossina palpalis palpalis and G. tachinoides, two riverine tsetse species, were discovered to have the broadest geographic range because they were identified in all six geopolitical zones of Nigeria. The study was done to find out if the Federal Capital Territory has any surveillance methods and to map out the communities impacted by trypanosomiasis and tsetse flies. In the Barangoni community in the Bwari Area Council, Abuja, Nigeria, tsetse flies have been found, and its effects on people and livestock have been established. The study employed cross-sectional survey research design to collect information from herdsmen and community dwellers, Whether there are frequent surveillance being deployed and the impact of , tsetse fly contact with livestock and human using structured questionnaire, pictorial representation and oral interview, random sampling technique was adapted for the study. The study's sample size was 31 people, including 12 ranchers and 19 city inhabitants. Frequency count and percentage analysis were performed on the data collected. In order to develop control strategies, it is necessary to keep a variety of records, including baseline information on the prevalence of trypanosomosis in local breeds of sheep, cows and goats. Infested areas also need to be mapped out in order to examine the various effects of bites, such as extreme exhaustion, loss of appetite, and other symptoms. Wide stretches of woodland savannah experience weight loss and exercise intolerance, which makes livestock weak, lag behind the herd, collapse, or even die. However, in the severe hot dry season, especially in the northern part of its range, the animal needs forest islands or riverine vegetation to hide in. This report describes the natural hosts that these tsetse species in Northern Nigeria use.

Keywords: Tsetse fly, African trypanosomiasis in humans, African trypanosomiasis in animals, spatial

4.21

THE PEER COMMUNITIY IN (PCI) PROJECT, PCI INFECTIONS, AND THE PEER COMMUNITY JOURNAL: A DIAMOND OPEN ACCESS WAY TO PUBLISH RESEARCH RESULTS ON TRYPANOSOMES AND THEIR VECTORS

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4.22

ATLAS NATIONAL DE DISTRIBUTION DES MOUCHES TSÉTSÉ AU TCHAD

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Résumé:

Au Tchad les données sur la distribution de glossines datent de plus de 25 ans. Pour combler cette lacune, plusieurs activités ont été menées. Il s'agissait notamment de renforcer la capacité du personnel en matière de gestion des données, et de créer le référentiel de données Atlas tsétsé du Tchad. En conséquence, des données sur les tsétsés ont été utilisée pour créer des cartes préliminaires de l'atlas Tchad de 2010 à 2022. Ces cartes sont constituées des données entomologiques basées sur les sites de piégeages, et elles incluent à la fois des données préalables déjà publiées, des données préalables jamais publiées, et des nouvelles données collectées spécifiquement en 2021–2022 pour combler les lacunes géographiques majeures. Au total cinq cent vingt-quatre (524) pièges biconiques ont été répertoriés et cartographiés. Ces cartes préliminaires nous montrent la présence de trois espèces de tsétsé notamment Glossine fuscipes fuscipes à l'extrême sud dans la zone la plus humide, G. tachinoides dans la zone semi-humide avec de nombreux cours d'eau et dans les environs des réserves. G. morsitans submorsitans Quant à elle est rencontrée dans la zone de savane et souvent proche des réserves et des parcs. Il est important de souligner la non accessibilité de certaines zones présentant des conditions favorables au développement des glossines à cause de difficultés d'accès (mauvais états des pistes, les intempéries, présence d'animaux sauvage etc.…). L'atlas national est un outil essentiel pour le contrôle et la surveillance de la trypanosomose animale africaine et ses vecteurs et constitue un élément important pour la prise de décision par les autorités au niveau national.

Mots clés : Tchad_Atlas_Mouches_Tsétsé

4.23

TRYPANOSOMES INFECTION, ENDOSYMBIONTS, AND HOST PREFERENCES IN TSETSE FLIES (GLOSSINA SPP.) COLLECTED FROM AKAGERA PARK REGION, RWANDA: A CORRELATIONAL XENOMONITORING STUDY

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The study determined the trypanosome infection, blood meal source, and endosymbionts in tsetse flies of Akagera Park region. Tsetse flies, comprising Glossina pallidipes (n = 771) and Glossina morsitans centralis (n = 330) were collected between May 2018 and June 2019. We used PCR – High-Resolution Melting and amplicon sequencing. The feeding frequency and the feeding indices (selection index - W) were calculated to identify the preferred hosts. An overall trypanosome infection rate of 13.9% in the fly's Head and Proboscis (HP) and 24.3% in the Thorax and Abdomen (TA) were found. Eight trypanosome species were identified in the tsetse fly HP and TA, namely: Trypanosoma (T.) brucei brucei, T. congolense Kilifi, T. congolense savannah, T. vivax, T. simiae, T. evansi, T. godfreyi, T. grayi and T. theileri. We found no evidence of human-infective T. brucei rhodesiense. We also identified eighteen species of vertebrate hosts that tsetse flies fed on, and the most frequent one was the buffalo (Syncerus caffer) (36.5%). The frequently detected host by selection index was the rhinoceros (Diceros bicornis) (W = 16.2). Most trypanosome infections in tsetse flies were associated with the buffalo blood meal. The prevalence of tsetse endosymbionts Sodalis and Wolbachia was 2.8% and 4.8%, respectively. No Spiroplasma and Salivary Gland Hypertrophy Virus were detected. These findings implicate the buffaloes as the important reservoirs of tsetse-transmitted trypanosomes in the area. The study findings provide the key scientific information that supports the current One Health collaboration in the control and surveillance of tsetse-transmitted trypanosomosis in Rwanda.

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4.24

DEVELOPING AN ATLAS OF TSETSE FLIES IN SOUTH AFRICA.

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Abstract

Evidence-based decision making for the progressive control of the animal trypanosomosis requires comprehensive, detailed and harmonized information on the occurrence, distribution and abundance of the tsetse vector at national level. In South Africa, two tsetse species, Glossina austeni and G.brevipalpis, are present, and they are restricted to north eastern KwaZulu-Natal province. The area exposed to the risk of the disease is approximately 14,000km2, with c. 250,000 head of cattle. The distribution of the two tsetse species has been studied over the past 30 years, including recent geospatial modelling of their suitable habitat. These maps and models are invaluable in guiding surveillance, control efforts and disease management.

To further develop this knowledge, a national atlas of tsetse and trypanosomosis for South Africa is being developed. This will include pre-existing and new data from the known area of occurrence, but also new data from neighboring areas and other possible areas of occurrence

To date, more than 6500 trapping events, representing more than 1300 trapping sites and 110,000 trap days have been included in the database. This data mainly cover one district, over a time period from 1993-2022. The data indicate that tsetse vectors are more abundant in protected areas than in communal and private farms. Future tsetse fly data collection activities will target two additional districts in the KwaZulu-Natal province, as well as the Kruger National Park and its surroundings (Limpopo and Mpumalanga Provinces).

4.25

ANNOTATIONS OF NOVEL ANTENNAE-EXPRESSED GENES IN MALE GLOSSINA MORSITANS MORSITANS TSETSE FLIES

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Tsetse antennae are primarily involved in chemoreception and mechanoreception. While most chemoreception-associated genes have been annotated in genomes of some tsetse species, substantial gaps with potentially important genes are uncharacterized especially in Glossina morsitans morsitans (Gmm). We generated antennae-specific transcriptomes from adult male Gmm flies that were fed or unfed then exposed to attractant, repellant or diluent paraffin. We first mapped the raw reads onto the Gmm gene-set from VectorBase and collected the unmapping reads using Bowtie2. We de novo assembled these unmapping reads using Trinity and searched for their respective homologs in UniProt using BLAST. Thereafter, we annotated novel genes associated with these divergent transcripts using MAKER, manually curated them using Apollo annotation tool and identified their putative orthologs annotated in Drosophila melanogaster (Dm), Musca domestica (Md) or Anopheles gambiae (Ag) genomes using OrthoFinder. Finally, we evaluated the differential expression of these novel genes among the respective treatments using rsem-ebseq pipeline. About 45.21% of the sequenced reads had no corresponding transcripts within Gmm gene-set. The reads assembled into 72,428 unique transcripts, most of which had no hits in UniProt (74.43%). We annotated 592 genes among which 202 were novel while 390 were isoforms of existing genes. About 46.53% of novel genes had orthologs in Dm, Md or Ag. One novel gene (GMOY014237.R1396) was differentially expressed in response to attractant relative to the unfed control. This study confirmed the existing gap in the annotation of Gmm genome and identified associated novel antennae-expressed genes of which >53% are potentially Gmm specific.

4.26

SPATIAL ANALYSIS OF THE DISTRIBUTION OF TSETSE FLIES IN MASAI MARA ECOSYSTEM, KENYA.

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Abstract

About 8% of Kenya is protected area for wildlife conservation. These areas provide ecological niche promoting interplay between wildlife reservoir hosts and tsetse. Masai Mara National Reserve, provides an interface for tsetse, wildlife, livestock and Maasai community to interact. Tsetse control relies on spatial distribution information. The study aimed at determining spatial distribution of tsetse and establishing linkage between climatic factors and presence of tsetse. Mapping of trap catches, spatial clustering and Multiple Factor Analysis (MFA) of tsetse with bioclim variables extracted from WorldClim was done. Glossina pallidipes, G. swynnertoni and G. brevipalpis were present. Glossina pallidipes was well distributed in 185 traps and spatial clustering showed one likely cluster including 30 traps with presence. Overall relative risk within cluster was 4.68 compared with 11.38 expected traps. High-risk cluster was statistically significant (p-value < 0.001). MFA showed structures induced by bioclim variables and species are closely related. Hierarchical Clustering on Principal Components (HCPC) performed after MFA suggested 5 clusters of traps of which 3 corresponded to tsetse presence with bioclims that increase the catches when their values increase being related to minimum temperature in coldest month and mean temperatures; of coldest quarter, wettest quarter and annual. Comparison of spatial cluster of traps with G. pallidipes presence using SaTScan with cluster characterizing species in HCPC showed either methods can be used in understanding distribution of tsetse. Mapping showed the species is concentrated in the central part of the National Reserve. Deployment of insecticide treated targets, periodic monitorings of tsetse, African Animal Trypanosomosis and Human African Trypanosomiasis was recommended and more variables such as vegetation to be incorporated in futures studies to consider all factors that determine distribution of tsetse.

4.27

ENHANCING AND UPDATING THE NATIONAL ATLAS OF TSETSE AND TRYPANOSOMIASIS IN ZIMBABWE

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Abstract

The first edition of the national atlas on tsetse and animal African trypanosomiasis (AAT) in Zimbabwe was published in 2021, and it included data for the period 2000–2019. For the entomological component, the atlas included only data from stationary traps. The atlas in now being updated to 2022, and enhanced to include flyround, polymerase chain reaction (PCR) diagnosis and publications data. Approximately 187354 trap days were added to the tsetse component, and 10931 tested domestic animals, mostly cattle, were added to the AAT component. Furthermore, flyrounds data in excess of 3000 traverses, are being compiled for the whole 2000–2022 period and will be incorporated into the latest edition of the atlas. This will greatly enhance the entomological component, and also fill a number of geographical gaps in the tsetse maps. Extant data from 37 identified publications previously not included, are being compiled. Finally, and most crucially, data on tsetse control operations are being compiled. These are mainly based on insecticide treated cattle and targets, and to a much lesser extent ground spraying. Vector and disease control data will be combined with the data from the epidemiological atlas to map the status of Zimbabwe in the progressive control pathway (PCP). The atlas and the related PCP map will inform the development of a PCP-smart national strategy and the related implementation roadmap.

Keywords: Atlas, Progressive Control Pathway, Control, Tsetse, AAT

4.28

ASSESSMENT OF STATIONARY TARGET TECHNOLOGY IN COMBATING TSETSE AND TRYPANOSOMIASIS IN CONSERVATION AREAS _CASE STUDY OF ENONKISHU AND OLKINYEI CONSERVANCIES MAASAI MARA, NAROK COUNTY, KENYA.

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ABSTRACT

Tsetse and trypanosomiasis challenge is high in conservation areas due to the presence of wildlife species preferred by tsetse for blood meals. The thick vegetations are the ideal habitats and breeding zones for tsetse flies. Olkinyei Conservancy in the Narok Kajiado tsetse belt is a typical wildlife habitat and tourism attraction area that restricts entrance of livestock with exceptions during extreme droughts. Enonkishu Conservancy uniquely integrates livestock keeping and wildlife conservation. The Objectives of this study were to assess the performance of the standard and tiny targets deployed in the conservancies over a period of two to three years. Trypanosomiasis Infection rates and trypanosome species were determined by screening of the livestock using microscopy and rapid diagnostic kits while tsetse fly species and density was determined by use of biconical traps that were deployed for 48hours. Tsetse fly density of 13.4 FTD was recorded at Olkinyei Conservancy in a baseline study conducted in 2017. In 2020, reported cases of African Animal Trypanosomiasis were high upon clinical diagnosis and treatments were averaging 60 doses per week. Flies per Trap per Day (FTD) of 34.6, were registered during the baseline survey while the Trypanosomiasis prevalence rate was 24.2%. Georeferenced standard and tiny targets were deployed over the intervention period and monitoring was done periodically to determine the progress. At Enonkishu conservancy, a monitoring survey of October 2021 showed that the tsetse fly population had reduced to a fly density of 4.7, while that of Olkinyei Conservancy was 3.0.

4.29

DISTRIBUTION OF G. PALLIDIPES AND TRYPANOSOME INFECTION STATUS IN TURKANA AND NEIGHBORING COUNTIES IN KENYA

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Abstract

The most abundant and therefore economically important tsetse fly species in Kenya is Glossina pallidipes (Ngari, et al, 2020). There are historical reports of G. pallidipes in Northwestern Kenya from past surveillance almost 30 years ago (unpublished data). This region has been subject to inter-ethnic and inter-state insecurity and violence fueled by competition for limited resources for nearly a century (Shanguhyia, 2021). The forests and bush thickets connecting Kenya, Uganda and South Sudan have remained un-interfered since these have been the routes used by cattle rustlers (Mutta, 2020; Wamuyu, 2014; Grady, 2011), and have remained tsetse habitats for decades. This study, therefore, sought to survey four counties in Northwestern Kenya, Turkana, West Pokot, Samburu, and Baringo for presence of G. pallidipes. Between November 2020 and June 2021, Ngu traps were set in suitable habitats for 24 to 30 hours due to the distances between sampling points and accommodation facilities, and information about each trap, fly catches, time and surrounding environment was captured on data collection sheets. Trap catches revealed high density of G. pallidipes in Kainuk in Southern Turkana bordering West Pokot County, and in Oropoi on the Northwestern boundary with Northeastern Uganda, with 10% infection rate. Few samples were collected from Baringo County thanks to control efforts by KENTTEC. Samburu and West Pokot Counties did not bear any catches. The study recommends sustained tsetse control in Baringo County, and a fresh focus on Turkana County in collaboration with defense forces to curb AAT in the area.

4.30

DYNAMICS OF INFECTION RATES OF TSETSE FLIES FED ON TRYPANOTOLERANT AND TRYPANOSUSCEPTIBLE CATTLE DURING AN EXPERIMENTAL INFECTION WITH TRYPANOSOMA CONGOLENSE

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Abstract

African cattle breeds differ in their ability to cope with African animal trypanosomosis. While Zebu breeds present high parasitaemia and anaemia, significant production losses and high mortality, West African taurine breeds are able to mitigate infection by limiting anaemia and parasitaemia, and are known trypanotolerant breeds. However, the ability of the different breeds to transmit trypanosomes to tsetse flies remains unknown, as does the impact of trypanotolerance and trypanosusceptibility on the disease epidemiology. The objective of our study was to assess the transmission rate of trypanosomes to tsetse flies from different cattle breeds throughout infection course under mosquito net-protected cowshed. For that purpose, we experimentally infected animals from three cattle breeds, trypanosusceptible Fulani Zebu, trypanotolerant N'Dama and local cross-bred animals between Fulani Zebu and European taurine with Trypanosoma congolense IL1180, and tsetse flies (Glossina palpalis gambiensis) were fed on each cattle at five time points during infection. Tsetse flies were then artificially fed with sterilized bovine blood via a silicone membrane and dissected for trypanosomes identification between 15 and 20 days after the first infected cattle blood feeding. The fraction of infected flies per cattle was 7% on average (median=10%), but with high variation, the infection rate varying from 0 to 60% (estimated by cattle and time point). Interestingly, the

time point that gave the maximum fraction of infected flies (mean=21%) was 54 days post-cattle infection. The inferred parameters of hosts and tsetse infection rates could be used to parametrise epidemiological models of trypanosomosis that integrate the role of cattle breeds on transmission dynamics.

Key-words: Trypanosoma congolense, Glossina palpalis gambiensis, cattle breeds, infection rate, trypanotolerance, transmission dynamic, Burkina Faso

4.31

DEVELOPING AN NATIONAL ATLAS OF TSETSE FLY DISTRIBUTION IN CHAD

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Abstract

Data on the distribution of tsetse flies in Chad are more than 25 years old. To fill this gap, several activities were carried out. These included building staff capacity in data management, and creating a data repository for the tsetse atlas in Chad. As a result, tsetse data were used to create preliminary maps for the Chad atlas from 2010 to 2022. These maps are made up of entomological data based on trapping sites, and include both previously published data, previously unpublished data, and new data collected specifically in 2021–2022 to fill major geographical gaps. A total of five hundred and twenty-four (524) biconical traps have been inventoried and mapped. These preliminary maps show the presence of three species of tsetse, in particular Glossina fuscipes fuscipes in the extreme south in the wettest zone, G. tachinoides in the semi-humid zone with numerous watercourses and in the vicinity of the reserves. G. morsitans submorsitans is found in the savannah zone, often close to reserves and parks. It is important to emphasise that certain areas that present favourable conditions for the

development of tsetse flies are inaccessible due to access difficulties (poor state of tracks, bad weather, presence of wild animals, etc....). The national atlas is an essential tool for the control and surveillance of African animal trypanosomosis and its vectors, and is an important tool in decision-making for the authorities at national level.

Key words : Chad, Atlas, Tsetse flies

4.32

THE ROLE OF STOMOXYS SPP. IN ANIMAL TRYPANOSOMIASIS TRANSMISSION DYNAMICS.

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ABSTRACT

Trypanosomiasis, an economically significant disease affecting livestock in Kenya and Africa, is increasingly spreading beyond its traditional geographical boundaries. Potentially, biting flies such as Stomoxys could mechanically transmit the disease to domestic animals. However, little is known about the transmission dynamics of these flies. The aim of this study was to determine the physiological ability of Stomoxys as a competent vector of trypanosomes and detection of the parasites in field Stomoxys populations, and analysis of host feeding patterns to incriminate Stomoxys in trypanosome transmission cycles. Molecular methods were employed to screen for trypanosomes and analyze host feeding patterns in Stomoxys. Vector competence of Stomoxys in transmitting trypanosomes was assessed through experimental infection assays. The molecular investigations of pathogens revealed presence of Anaplasma spp. (49.1%), Ehrlichia spp. (34.5%), Trypanosoma vivax (5%), T. evansi (3%) and Theileria/Babesia (1%). Similarly, Stomoxys fed on various wild and domestic animals with cattle being the most preferred blood meal source. In addition, more than 80% of the Stomoxys showed positive infection in their crop and gut, and 30% in the proboscis after immediate feeding disruption. In vitro experiments showed that Stomoxys transmitted T. evansi with a success rate of 20%, while the in vivo transmission rate was 5%. These findings highlight the potential role of Stomoxys as a vector for trypanosomes. The insights gained from this study can guide to the development of effective control strategies aimed at reducing the transmission of trypanosomes.

4.33

DEVELOPMENT OF A NATIONAL ATLAS OF TSETSE FLIES AND ANIMAL TRYPANOSOMOSIS IN CAMEROON

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Abstract

After more than fifty years of tsetse fly and African animal trypanosomiasis (AAT) control, some information is available in Cameroon. However, there is a lack of geo-referenced and harmonised data at national level. Despite the fact that a number of epidemiological studies have been carried out over the years, no national map of the prevalence of AAT and its vectors is available. To fill these gaps, the Mission Spéciale d'Eradication des Glossines (MSEG), as part of the project 'COntrolling and progressiveley Minimizing the Burden of Animal Trypanosomosis' (COMBAT), is in the process of setting up a national atlas of tsetse flies and AAT in Cameroon. Preliminary results are presented here. The data used to produce this atlas come from raw epidemiological data collected between 2005 and 2022 by the MSEG, and from articles published during the same period. To date, 513 study sites have been mapped. Unfortunately, however, national coverage is uneven, with little data for the western regions and no information for the south-western and north-western regions. However, a relatively consistent set of data was collected on tsetse species of veterinary and medical importance, particularly for the palpalis and morsitans groups, while more limited information was found for the fusca group. As far as the AAT component is concerned, Trypanosoma congolense, T. vivax and T. brucei are the most frequently recorded species. Despite the various shortcomings, the atlas

is set to become a national reference. For Cameroon, it also represents a very important step towards strengthening the epidemiological surveillance system and developing a control strategy for AAT, as well as a roadmap based on the Progressive Control Pathway (PCP).

Key words: atlas, African animal trypanosomosis, tsetse fly, Cameroon.

4.34

THE «GREMANSIN» PYRAMIDAL TRAP FOR CAPTURING AND FIGHTING AGAINST TSETSE FLIES (DIPTERA GLOSSINIDAE). LATIN SQUARE TESTS AND DESCRIPTION OF THE NEW CAPTURE SYSTEM

SUMMARY

In Democratic Republic of Congo , vector control against tsetse flies is using traps for a long time. The PNLTHA of DRC is using a trap conceived on the basis of the pyramidal one. More recently a new trap, the Gremansin, was conceived and tested by the entomological service of PNLTHA. This trap mixed the concepts of the pyramidal one and of the Vavoua trap. It has a good efficiency, and allows to squize the use of metal, evenfor the Roubaud's cages as for the rebars

4.35

AN ATLAS TO SUPPORT THE PROGRESSIVE CONTROL OF TSETSE-TRANSMITTED ANIMAL TRYPANOSOMOSIS IN BURKINA FASO.

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Abstract

Background: African animal trypanosomosis (AAT), transmitted by tsetse fies, is arguably the main disease constraint to integrated crop-livestock agriculture in sub-Saharan Africa, and African heads of state and governments adopted a resolution to rid the continent of this scourge. In order to sustainably reduce or eliminate the burden of AAT, a progressive and evidence-based approach is needed, which must hinge on harmonized, spatially explicit information on the occurrence of AAT and its vectors.

Methods: A digital repository was assembled, containing tsetse and AAT data collected in Burkina Faso between 1990 and 2019. Data were collected either in the framework of control activities or for research purposes. Data were systematically verifed, harmonized, georeferenced and integrated into a database (PostgreSQL). Entomological data on tsetse were mapped at the level of individual monitoring traps. When this was not possible, mapping was done at the level of site or location. Epidemiological data on AAT were mapped at the level of location or village.

Results: Entomological data showed the presence of four tsetse species in Burkina Faso. Glossina tachinoides, present from the eastern to the western part of the country, was the most widespread and abundant species (56.35% of the catches). Glossina palpalis gambiensis was the second most abundant species (35.56%), and it was mainly found in the west. Glossina morsitans submorsitans was found at lower densities (6.51%), with a patchy distribution in the southern parts of the country. A single cluster of G. medicorum was detected (less than 0.25%), located in the south-west. Unidentifed tsetse flies accounted for 1.33%. For the AAT component, data for 54,948 animal blood samples were assembled from 218 geographic locations. The samples were tested with a variety of diagnostic methods. AAT was found in all surveyed departments, including the tsetse-free areas in the north. Trypanosoma vivax and T. congolense infections

were the dominant ones, with a prevalence of 5.19±18.97% and 6.11±21.56%, respectively. Trypanosoma brucei infections were detected at a much lower rate (0.00±0.10%).

Conclusions: The atlas provides a synoptic view of the available information on tsetse and AAT distribution in Burkina Faso. Data are very scanty for most of the tsetse-free areas in the northern part of the country. Despite this limitation, this study generated a robust tool for targeting future surveillance and control activities. The development of the atlas also strengthened the collaboration between the diferent institutions involved in tsetse and AAT research and control in Burkina Faso, which will be crucial for future updates and the sustainability of the initiative. Keywords: Glossina, Tsetse, Database, African animal trypanosomosis, Map, GIS.

4.36

HABITAT PREFERENCES, ACTIVITY PATTERNS, FEEDING HABITS AND TRYPANOSOME INFECTION RATES OF GLOSSINA SWYNNERTONI AUSTEN (DIPTERA: GLOSSINIDAE) IN AITONG, MASAI MARA, KENYA

Paul Nduati Ndegwa

Abstract

Glossina swynnertoni Austen is a morsitans group tsetse and a known vector of animal and human trypanosomiasis in Africa. Habitat preferences, activity patterns, feeding habits and trypanosome infection rates of G. swynnertoni were studied in Aitong area of the Maasai Mara ecosystem using Siamese traps and vehicle patrols, electrified nets, ELISA and, parasitological and molecular techniques, respectively. Glossina swynnertoni inhabited three main habitats: large thickets, wooded grasslands and Acacia-Commiphora community with apparent density varying significantly being highest in the Acacia-commiphora habitat, intermediated in the wooded grasslands and lowest in the large thickets. Density also varied seasonally with higher densities occurring in the rainy season in all three habitats Vehicle patrol was a more effective and rapid method for sampling G. swynnertoni than either Siamese traps or electrified screens. However, vehicle patrol catches were strongly biased in favour of males (4:1). Diurnal activity in the Acacia-Commiphora community was unimodal for both sexes, with peaks of activity occurring at 1100–1200 h for males and at 1400–1500 h for females. Both sexes remained active in the afternoon but activity declined rapidly towards dusk (1700–1800 h). The flies fed mainly on Suidae, with 64% of their bloodmeals being derived from this family. Other less favored hosts in the area included ruminants (3.9%), hippopotamuses (3.5%), Felidae (3.5%) and humans (3.5%). Wild-caught G. swynnertoni were moderately infected with trypanosomes, with vivax group infections accounting for 8.7% and congolense group, 1.8%. Although immature gut infections that could have been T. brucei subgroup or congolense type were encountered in 0.4% of the flies, no salivary gland infections were encountered in the 1,612 flies dissected. The presence of this tsetse in Aitong area may pose a significant threat to tourism, and pastrolists and their livestock.

4.37

EVALUATION OF THE SPECIFIC DIVERSITY OF TSETSE FLIES, VECTORS OF HUMAN AND ANIMAL TRYPANOSOMES, IN THE MOUKALABA DOUDOU NATIONAL PARK (SOUTH-WEST OF GABON)

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Communication Displayed

Abstract

The abundance and specific diversity of tsetse flies were assessed by capturing insects using Vavoua traps during the long dry season, from 17th July 2014 to 22nd August 2014 in three types of biotope: Forest, Savannah and village. (Anthropogenic environment), in the Moukalaba Doudou National Park in Gabon. A total of 4676 flies were harvested, giving an apparent density per trap and per day (DAP) of 6.01 g/p/d. Of that total number, about 3141 (67.2%) specimens were captured in the forest, 930 (19.9%) in the village and 605 (12.9%) in the savannah. Six species and subspecies of tsetse flies belonging to subgenus Nemorhina (93.6%) and subgenus Austenina (6.4%) were caught. The subgenus Nemorhina comprised three species including G. f. fuscipes (98.79%) G. palpalis palpalis (0.59%) and G. tachinoides (0.62%). As for the Austenina subgenus, it was represented by three species including G. nashi (51%), G. frezili (33.7%) and G. Fusca congolensis (15.3%). G.f. fuscipes 4323 (92.45%) wasthe most abundant species with an apparent density per trap of 5.56g/p/d. this species is followed by G. nashi 153 (3.27%) and G. frezili 101 (2.16%) moderately represented with DAP of 0.19 and 0.12 g/p/d. The other species G. palpalis palpalis 26 (0.56%), G. tachinoides 27 (0.58%) and G. Fusca congolensis 45 (0.98%) constituted the less abundant species with respective DAPs of 0, 56 ; 0.03 and 0.05g/p/d. The highest tsetse abundance was obtained in Forest with 3141 (67.2%) and the lowest in Savanna 605 (12.9%).

Keywords: Vavoua, Glossines, Doussala, Moukalaba Doudou, Gabon

4.38

ECO-DISTRIBUTION AND RATE OF ACTIVITY OF HAEMATOPHAGOUS FLIES (GLOSSINIDAE) IN TWO ENDEMIC FOCI OF HUMAN AFRICAN TRYPANOSOMIASIS IN GABON.

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Abstract

Introduction: Human African trypanosomiasis is caused by a flagellate protozoan whose transmission to humans is ensured by the tsetse fly. The disease is endemic to Gabon even though the number of cases has decreased in recent years. Thus, an entomological study based on the use of traps was carried out in the two main foci in order to judge whether or not the transmission of this parasitic disease was maintained.

Methodology: This study was carried out in the homes of La Noya and Kango. The capture of the flies was done using Vavoua and Biconical type traps, between January 15th to 29th, 2022 at the rate of 5 days of captures per site. Collected flies were stored in pillboxes, containing 70% alcohol, and then transferred to ependorfs after identification.

Results: In each site, 24 traps were set (14 Vavoua and 10 biconical). In total, 754 flies were caught, in which 505 flies (67%) in Noya and 249 flies (33%) in Kango. The apparent density per trap and per day was 4.21 Tsetse flies/Trap/Day at La Noya and 2.08 G/P/D at Kango. Six species have been identified at La Noya and 4 at Kango. It was seen that Glossina palpalis palpalis was mostly identified with Noya (308 flies or 61%) and Kango 154 flies (62%). For Glossina fuscipes fuscipes, 158 flies (31%) was idenfify in La Noya and 87 flies (35%) in Kango; that specie is the second most common species.

Conclusion: The abundance of HAT vectors in these endemic foci suggests long-lasting transmission of the human trypanosome and the difficulty of achieving elimination if vector control is not carried out. It is also important to specify the epidemiological importance of these vectors, their seasonal dynamics and to characterize the pathogens they harbor.

Keywords: Glossina, Vavoua trap, Biconical trap, Kango, Noya, Gabon

4.39

TRYPANOSOME INFECTION RATES OF TSETSE FLIES IN THE CATTLE CORRIDOR DISTRICT OF NAKASONGOLA,CENTRAL UGANDA

Sarah NANSUBUGA

ABSTRACT

Background: African Trypanosomiasis (AT), transmitted cyclically by the tsetse fly (Glossina species), is a major obstacle to production in most tropical parts of Africa. Reliable data on the vector distribution and the trypanosome species they carry, is pertinent to planning sustainable control strategies. The objective of this study was to determine the infection rates of trypanosomes in Glossina species and the apparent density and distribution of Glossina species in the cattle corridor district of Nakasongola in Central Uganda. Methods: A cross-sectional survey of tsetse flies was conducted in the study area in Nakasongola district in Central Uganda. 52 biconical tsetse fly traps were set in five villages in three Sub Counties (Nabiswera, Nakitoma and Kalungi) in the month of August 2019 to obtain information on the apparent density and distribution of the vectors. Trapped tsetse were collected, sexed, identified and tsetse tissues dissected to determine the presence of trypanosomes by a molecular tool. A subset of the collected samples was analyzed for detection of trypanosomes species and subspecies using a nested PCR protocol based on primers amplifying the Internal Transcribed Spacer (ITS) region of ribosomal DNA. Results: In total, 259 tsetse flies were captured (112 males and 147 females), all of which were Glossina fuscipes fuscipes. Tsetse flies were caught only in Nakitoma Sub County in two villages (Kafu and Namalere). Namalere had the highest catches (189) with 98 females and 91 males). Kafu had a total of 70 tsetse flies (21 males and 49 females). The apparent density of tsetse flies in these two villages ranged from 1.9 to 3.7 flies caught per trap per day (FTD). The trypanosome infection rate was 26% (21/80) with two trypanosome species, detected by PCR: T. congolense 71 % (15/21) followed by T. Vivax 19 % (4/21). The level of mixed infection was 10% (2/21) with T. congolense and T. vivax. Female flies were more infected 52% (11/21) compared to males 48% (10/21) so, the infection rate was significantly related to sex of the fly ($x2= 2.386$, $df=2$, $p=0.030$). Conclusion and recommendation: The prevalence of trypanosomes infection in tsetse fly was high, especially in the Kafu and Namalere areas. An intervention programme aimed at reducing the vector population needs to be urgently initiated, as well as investigation of the presence of trypanosomes in livestock in these villages and treatment.

4.40

APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEM AND IMAGE PROCESSING SOFTWARE IN BASELINE ENTOMOLOGICAL DATA COLLECTION FOR T&T ELIMINATION IN NIGERIA

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Abstract

Human and animal trypanosomiasis continue to contribute substantially to the overall burden of diseases in Nigeria, thus posing a serious hindrance to food security and sustainable rural development in most part of the country that are infested by the tsetse fly, the vector of the disease.

A number of current initiatives are being used to tackle different aspects of the tsetse and trypanosomiasis (T&T) problem.

A number of research institutes and nongovernmental organizations are also working to curb the T&T problem through demand-driven research and health relief operations. In this context, the Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) takes a major role in setting, harmonized criteria, defining guidelines and developing standardized tools and methodologies for strategic interventions and operational decision-making.

Keywords: Trypanosomiasis; T&T, PATTEC; Tsetse fly.

4.41

ISOLATION AND IDENTIFICATION OF BACTERIA FROM THE GUT MICROBIOTA OF A LABORATORY POPULATION OF GLOSSINA PALPALIS GAMBIENSIS (DIPTERA: GLOSSINIDAE), CIRDES: A PRELIMINARY STUDY

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Abstract

Managed laboratory tsetse colonies are threatened by pathogens including viruses, bacteria, and fungi. Some bacteria found in the gut of tsetse are major causes of Tsetse fly mortality. This preliminary study aimed to explore the diversity of bacteria in the intestinal microbiota of Glossina palpalis reared at CIRDES Tsetse facilities. Using traditional culture-based methods, we determined the presence and abundance of bacteria in the intestines of 47 random samples of tsetse flies collected in the laboratory. Species identification was performed using the compact Vitek 2 automated system and the Api 20 E gallery. Results indicated 96 different bacteria isolated including 36 strains identified as members of the thirteen genus: Aeromonas (n=2), Brucella (n=1), Chryseomonas (n=1), Enterobacter (n=1), Micrococcus (n=3), Pasteurella (n=3). Pseudomonas (n=3), Serratia (n=4), Staphylococus (n=1), Stenotrophomonas (n=8), Tatumella (n=1), Vibrio (n=2), Xanthomonas (n=6). Thus, Stenotrophomonas, and Xanthomonas, followed by Serratia, Pseudomonas, Pasteurella and Micrococcus were de most common. Among male tsetse flies, 16% of the bacterial genus belonged to Stenotrophomonas; however, Xanthomonas was the most common genus (13.89%) in females (D: 0.23, $p > 0.05$). These preliminary results suggest a high bacterial diversity in the gut microbiota of laboratory-reared tsetse flies. Further studies are needed to characterize these bacteria in more detail, evaluate their role in the health of tsetse flies, their interactions with other pathogens, and explore management approaches aimed at reducing the impact of pathogenic bacteria on captive tsetse populations.

Keywords: laboratory tsetse colonies, pathogens, intestinal microbiota, diversity.

4.42

A SCOPING REVIEW ON TSETSE FLY BLOOD MEAL SOURCES AS REPORTED SINCE 1956 TO DATE: POTENTIAL OPPORTUNITIES TO GUIDE STRATEGIES FOR INTEGRATED VECTOR AND VECTOR-BORNE DISEASE CONTROL

SEREM ERICK KIBICHIY

Background: Tsetse flies (Glossina spp.) are the biological vectors of African trypanosomes, which cause fatal African trypanosomiases in humans and animals and substantial agricultural losses. Targeting the tsetse fly vector is the most promising way to block trypanosome transmission but requires comprehensive understanding of tsetse fly biology and host preference to design traps with olfaction and visual cues. No current review exists on host preference and blood meal analyses of tsetse flies.

Methods: A scoping review on bloodmeal sources of tsetse flies from 1956 to August 2022 was done. The review focused on tsetse fly species, blood meal analyses methods, hosts identified and countries. Pre-determined eligibility criteria was used to retrieve and screen the articles.

Results: Only 49 out of the 393 articles retrieved were included. The studies were conducted in 22/38 (57.8%) tsetse fly-endemic countries. The majority were from Kenya (21.2%), Uganda and Zambia 9.1% while Cameroon and Tanzania had 7.6%. The blood meal analyses methods included precipitin, haemagglutination, disk diffusion, complement fixation, ELISA, and PCR-based assays. Most studies conducted from the year 2007 (79.2%; 19/24) used PCR-based assays to amplify Cyt b for sequencing.

Conclusion: Nearly half and about a third of tsetse fly endemic countries and tsetse fly species, respectively, have had no blood meal analyses done. Future studies on tsetse fly blood meal sources could focus on the less-studied species and the use of small fragment DNA such as the mammalian 12S RNA and 16S RNA genes sequenced by second or third generation technologies improve sensitivity.

4.43

MASS REARING OF TSETSE FLIES IN KALITY INSECTARY, ADDIS ABABA, ETHIOPIA

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Summary

Objective: Based on the successful elimination of Glossina austeni from Unguja island of Tanzania using an AW-IPM with a final SIT component, the Southern Tsetse Eradication Progamme was created to apply this strategy in Ethiopia with the aim of creating a zone free of tsetse flies in the southern Rift valley. The AHI is currently releasing sterile male tsetse flies as the final component of AW-IPM project for the elimination of Glossina pallidipes and G. fuscipes fuscipes from Deme valley. These sterile males are produced in Kality Tsetse Fly Research Centre, Addis Ababa, Ethiopia.

Methods: Tsetse flies are held in production cages maintained on TPU4. Colonies of tsetse fly are fed in vitro on sterile fresh frozen, defibrinated blood. All the blood flies are fed twice per week using sterile trays and membranes in environmental conditions that are similar to those under which they are held (75 -80% rH and 23.5-24.5□C). Adults are sorted by sex following immobilization at +4□C and flies are loaded into 20cm diameter cages in 1:4 male to female ratio. Excess males are sterilized through gamma irradiation and released by air over the target area.

Result: The colony in Kality insectary experienced a sustained increase, fecundity of the fly increased and mortality rate decreased.

Conclusion: The performance of tsetse colonies is very sensitive to management at the technical and human resources level. Strict adherence to the SOP on the technical side and implementation of an adaptive management can ensure optimal growth of colonies.

4.44

APPARENT DENSITY AND MOLECULAR DETECTION OF TRYPANOSOME PARASITE FROM GLOSSINA SPP. COLLECTED IN COMMUNAL AREAS AND PRIVATE GAME FARMS AROUND NORTH EASTERN KWA-ZULU NATAL, SOUTH AFRICA

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Abstract

Glossina spp.are blood feeding flies confined to sub-Saharan African and biological vectors of trypanosome parasite that causes African Animal Trypanosomiasis and Human African Trypanosomiasis. Only two species are found in South Africa namely; Glossina brevipalpis and Glossina austeni. These flies are confined to the north-eastern KwaZulu-Natal and this is the southernmost distribution of this genus. The aim of this study was to determine the apparent density of Glossina spp. collected from communal, commercial farms as well as private game farms in north eastern KwaZulu-Natal Province and to detect the trypanosome parasites they are likely to transmit to the livestock in the area. Flies were trapped using H-traps baited with 1-octen-3-ol, 4-methylphenol and acetone. Trapped flies were sorted according to species and sex and stored in 70% ethanol. DNA was extracted using Qiagen DNA extraction kits. Preliminary PCR using universal ITS-1 primers supplemented with species-specific PCR assays were used for the detection of trypanosome DNA from the collected flies. From 208 collected flies from 10 sites (seven communal areas and one commercial farm and two private game farms) showed that the apparent density was high in Mvutshini communal land (9.14) and lowest in Mkonge farm (0.43). Ongoing molecular screening for trypanosome parasites showed that Trypanosoma congolense is currently the dominant parasite from the collected samples. These results also showed that there is still circulating trypanosome parasites within tsetse fly populations in the area. More samples must be screened to further confirm these results.

4.45

THE SIGNIFICANCE OF COMMUNITY LIVESTOCK SPRAYING IN THE FIGHT AGAINST TSETSE AND TRYPANOSOMIASIS: A CASE OF KWALE COUNTY, KENYA

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Stationary targets and moving targets offer an effective method of control against tsetse and trypanosomiasis. Insecticide treated targets have been deployed in the farmlands of Kwale at a while communities have also engaged in livestock spraying to control the vector and disease. In some of the areas of intervention, the targets have reduced the fly densities yet in other areas of the county there was no change. This combination used over a period of 10 years resulted in reduced disease prevalence from 1.65% to 0.333%. The FTDs over the time period varied between the settled and conservation areas. The number of insecticides treated targets contributing to this change is known but the proportion of livestock sprayed by communities to control tsetse flies is not known. We seek to assess the proportion of livestock being covered in such areas and if livestock population sprayed is optimal for the control of tsetse and trypanosomosis. The study will identify registered livestock spraying groups of farmers in Kwale County, Kenya. The field work will be carried out between July and August 2023. All identified crush pens will be geo-referenced and questionnaires administered to capture crush pen data attributes including status of the group, membership of the group, number of livestock sprayed, frequency of spraying and the insecticide used among others. The data will be processed and tabulated using Statistical Package for Social Scientists (SPSS) to obtain proportions of livestock sprayed village by village. This information will be matched to tsetse abundance and AAT prevalence in the area as recorded in KENTTEC database, mapped and used for development of extension packages for tsetse and trypanosomiasis interventions by devolved units of Government and private institutions involved in tsetse control.

4.46

IMPACT OF DELTAMETHRIN IMPREGNATED SCREENS ON TSETSE FLY POPULATION DENSITIES AND TRYPANOSOMES CIRCULATION IN CAMPO TRYPANOSOMOSES FOCUS, SOUTHERN CAMEROON

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ABSTRACT

Tsetse control has contributed to trypanosomes elimination in many African foci. In Cameroon, The Campo focus persists, and around 20 new HAT cases were diagnosed and treated in 2019. In this study, we evaluated the impact of deltamethrin impregnated screens ("Tiny Targets") on tsetse densities and trypanosomes circulating in Campo. Pre-intervention densities were recorded through tsetse captures with pyramidal traps and their trypanosome infection rates were detected with PCR. Around 2000 insecticide-treated screens were deployed in the South-Western area and replaced every six months, while the Eastern part was considered as control. Post-intervention surveys were conducted every six months and tsetse densities and trypanosome infections were compared with initial records. We observed a reduction in fly catches by 73.69% after twelve months of control; pre-intervention: 2.48 (1.92-3.14) flies/trap/day; 12-months post-intervention: 0.66 (0.42-0.94) tsetse/trap/day. This decrease was not sustained after 18 and 24-months post-intervention with increased densities of 1.45 and 1.71 tsetse/ trap/day respectively. This recovery could be due to implantation of a palm grove that diverted animals from their normal routes to villages. In control area, there was a general density increase, from 2.43 to 3.64 tsetse/trap/day after 2 years. In addition, trypanosome infection rates significantly dropped by around 75% in in both areas (from 21.20% to 5.06%

and from 13.14% to 3.45% respectively). Our study showed the importance of vector control in reducing trypanosomes circulation, providing evidence for the integration of this tool in current strategies towards trypanosomiasis elimination in Campo.

Keywords: Tsetse Control, "Tiny Targets", Trypanosomiases Elimination, Cameroon.

4.47

THE OCCURENCE AND DISTRIBUTION OF GLOSSINA PALPALIS PALPALIS IN RELATION TO PROBABLE TRANSMISSION OF ATYPICAL TRYPANOSOMAL INFECTIONS AT THE OLD OYO NATIONAL PARK, NIGERIA: A PRELIMINARY REPORT

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Abstract

A survey of tsetse flies (Glossina spp) was undertaken at the Old Oyo National Park in order to find out the prevalence of atypical trypanosomal infections in the caught flies. A total of One Hundred and Thirty Five (135) tsetse flies was caught (Table 1). The tsetse fly Glossina palpalis palpalis was the dominant species encountered during the survey with a combined apparent density of 2.21 Fly /Trap/day (F/T/D,). The sex ratio distortion of the flies captured was in favour of the females. Whereas the female population constituted 57.89%, the males made up 42.11% of the total catch. The population of tsetse encountered varied between the two locations where trapping was carried out probably due to variation in microclimatic conditions between the two sites. However, there was no significant difference in the apparent densities recorded between the two sites surveyed, Ibuya River, 51.13% (AD 1.51 F/T/D), and 48.87% Ibuya pool (AD 4.33 F/T/D) respectively. Other catches were identified morphologically to include other haematophagous flies of medical and veterinary importance such as Stomoxys and Musca spp. This finding supports earlier reports indicating that the Old Oyo National park is infested with the tsetse fly G. palpalis palpalis. Previous reports have indicated high trypanosome infections in Glossina spp collected in the Old Oyo National Park including Trypanosoma grayi a stercorarian trypanosome found in crocodiles (Crocodilus niloticus). It is possible that this parasite still exists at the OONP since the Ibuya pool is home to large populations of crocs. This study is very important especially as this parasite and other atypical trypanosomal infections have been reported in cattle in Nigeria and other parts of the Africa sub-continent.

Key words: Survey, Glossina palpalis palpalis, Atypical infections, Trypanosoma grayi, Old Oyo National Park, Nigeria

4.48

THE TRIAD OF TSETSE FLIES, TRYPANOSOME PARASITES, AND ENDOSYMBIOTIC BACTERIA AMONG THE WILD POPULATION OF TSETSE FLIES IN NIGERIA.

Attahir Abubakar

The study examines the triad relationship between tsetse flies, trypanosome parasites, and endosymbiotic bacteria in the wild population of tsetse flies in Nigeria. The research findings reveal several key observations. Firstly, there is a positive correlation between the presence of endosymbionts and trypanosome infection, indicating that specific endosymbionts are necessary for trypanosome infections. The study also identifies variations in co-infection rates between Wolbachia and trypanosomes across different tsetse fly species. While the presence of Wolbachia does not significantly affect trypanosome establishment, specific endosymbiont species like Sodalis demonstrate a significant association with trypanosome infections. Moreover, the prevalence of trypanosome infections differs among tsetse fly species and study areas, likely influenced by microorganism density and environmental factors. The research emphasizes the complexity of the tripartite relationship, influenced by tsetse biology and environmental factors. Additionally, the genetic characteristics of endosymbionts and trypanosome species can affect the tripartite association, and certain endosymbiont species may impact the vectorial competence of tsetse flies. Further investigations into natural populations of different tsetse species in various infested areas are needed to better understand this tripartite relationship. Genetic characterization of the endosymbiont population could provide insights into the contribution of each endosymbiont and enhance understanding of the triad relationship.

LAND USE ENVIRONMENT AND SOCIO-ECONOMICS

COMMUNITY PARTICIPATION

5.01

SUSTAINABILITY OF INSECTICIDE TREATED CATTLE (ITC) STRATEGY AS AN INCOME GENERATING ACTIVITY (IGA) FOR COMMUNITY BASED ORGANIZATIONS IN TSETSE AND TRYPANOSOMIASIS CONTROL:A Case Study of Osiligi Lo Laramatak and Enduata Ngenjuk Community Groups – Narok county

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ABSTRACT

Support for tsetse control operations targeting incorporation of Community Based Organizations (CBOs)is one of the approaches that advocates for ownership and sustainability, as well as for generation of income for the actors. Insecticide Treated Cattle (ITC) as a tsetse control strategy has gained popularity over the years due to its ease of application and minimal initial capital requirements. Minimum threshold of 100 animals are targeted per area per week for the method to be effective against tsetse fly populations. In this study, the two self-help groups were recruited and supplied with seed insecticide for communal spraying of livestock as a tsetse control strategy. The groups were monitored periodically to register spraying figures and their financial records maintained over a period of 5 years. Diversification to other projects from the money generated from spraying activities was also encouraged and documented. The monetary collections from communal spraying led to the establishment of a revolving fund, the communities are able to self sustain by purchasing inputs and reducing dependency on hand outs. Community participation in tsetse control through insecticide treated cattle strategy is a viable, self-sustaining activity that is income generating and can result in the economic development/progress of communities. Osiligi Lo Laramatak group influenced the registration of ten other tsetse control CBOs in the locality which embraced the model while Enduata Ngenjuk CBO also influenced the registration of 8 other vibrant control groups and both recorded monetary growth and diversification of income generating activities.

5.02

A REVIEW OF WOMEN PARTICIPATION IN COMMUNITY TSETSE AND TRYPANOSOMIASIS CONTROL IN WESTERN REGION OF KENYA

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Abstract

Community participation in disease control facilitates sustainability of programs. This study reviewed the participation of women in trypanosomiasis control activities carried out by Kenya Tsetse and Trypanosomiasis Eradication Council. The objective of the study was to assess trypanosomiasis control activities that engaged women at community level and establish trends of women involvement vis a vis their male counterparts. Women involvement in KENTTEC activities from the year 2019 to 2023 was reviewed using sixty reports from KENTTEC repository. For each activity the number of female and male participants was recorded, coded and entered in a MS Excel spread sheet then analyzed using Stata software. Descriptive statistics were used to measure relative frequencies of variables. Results indicated that women involvement in KENTTEC activities is low,but has increased over the five year period. Whereas communal spraying leadership was dominated by men, (71.4%), the treasurers role was mostly given to women (57.1%). The proportion of women who presented their livestock for spraying and trypanosomiasis screening increased (23.2% to 46.7% and 16.4% to 19.5%) respectively. Despite the increase in proportion of women attending sensitization meetings (48.6% to 71.5%), the proportion of women using livestock protective fences dropped (47.8% to 14.3%). Women do not register complaints with the council (0%). In conclusion, women involvement in trypanosomiasis control activities is lower than men but is steadily increasing. Targeted strategies are needed to improve women participation for sustainability of programs since they stay with livestock when men move for other economic activities.

5.03

KNOWLEDGE, ATTITUDE AND PRACTICES ON TSETSE CONTROL AMONG COMMUNITIES IN KILIFI COUNTY, KENYA

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Abstract

Tsetse flies are vectors of African trypanosomiasis in animals. Large losses due to nagana have been reported and this indicates the importance of tsetse control to avoid estimated losses. This study assessed the knowledge of tsetse and control practices used by the local communities in Kilifi. A cross sectional study was conducted to collect data from 380 randomly selected household using a structure questionnaires. Focus group discussions were conducted and four key informant interviewed. The data was analyzed using largely descriptive statistics and content analysis method. The respondents had inadequate knowledge of tsetse such that they confused them with other similar flies. On the other hand, they demonstrated knowledge of tsetse control measures. Control approaches includes: animal spraying (42.2%), bush clearing (66.7%), use of insecticide impregnated targets (3%), netting of zero grazing units (10%) and restriction of animals from tsetse infested areas (65.6%). Treatment of trypanosomiasis cases (65.1%). The farmers had positive attitude towards control methods however most of the them did not use the recommended methods largely due to the cost associated with them. Animals spraying frequency per month varied among respondents. Thirty percent sprayed once and 14.6% did not spray at all. Therefore, enabling local community members to have clear knowledge of tsetse flies is an important starting point for mobilizing them to take appropriate control measures against tsetse.

Key words: Trypanosomiasis, Tsetse fly

5.04

THE ECONOMIC COST OF BOVINE TRYPANOSOMOSIS IN PASTORAL AND AGO PASTORAL COMMUNITIES SURROUNDING MURCHISION FALLS NATIONAL PARK, BULIISA DISTRICT, UGANDA

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Animal diseases that are endemic like tsetse transmitted trypanosomosis cause the continuous expenditure of financial resources of livestock farmers and loss of productivity of livestock.

A cross-sectional survey to estimate the economic cost of bovine trypanosomosis was conducted in cattle-keeping communities living around Murchision falls National Park, in Buliisa district Uganda. Data was collected on herd structure, the cost of treatment and control, prevalence of morbidity and mortality rates due to trypanosomosis, and salvage sales losses in cattle herds in the last year.

In this study, 55.4% (n= 87) of the households reported their cattle had been affected by trypanosomosis during the previous last year. There was a high economic cost of trypanosomosis (USD 653) per household in cattle-keeping communities in Buliisa district of which 83% and 9% were due to mortality and milk loss respectively/ High mortality loss was due to low investment in treatment. The study showed that prophylactic treatment 3 times a year of the whole herd of cattle using Samorin ® (Isometamidium chloride) at a cost of USD 110 could drastically reduce cattle mortality loss due to trypanosomosis due to trypanosomosis with a return on investment of USD 540 annually per herd. This could be coupled with strategic restricted insecticide spraying of cattle with deltamethrin products.

The results show a high economic cost of trypanosomosis in cattle-keeping communities in Buliisa district, with cattle mortality contributing the largest proportion of the economic cost. The high mortality loss was due to low investment in treatment of sick cattle.

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MARKET SURVEY AND CONSUMER PREFERENCE FOR NOVEL TSETSE FLY REPELLENT IN TANZANIA

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ABSTRACT

Search for effective strategies to sustainably control tsetse and trypanosomosis has led to development of a Novel Tsetse fly Repellent Blend (NRB). To facilitate product development and commercialization in Tanzania, it was crucial to identify target market and understand customer needs. This study presents findings of questionnaire-based survey conducted among 114 respondents from Simiyu, Mara, Arusha and Manyara the tsetse infested regions of Tanzania. Respondents experienced 1) NRB masked with a fragrance odor provided for potential individual protection and/or 2) native (un masked) NRB for to cattle protection, dispensed as tail and/or neck prototypes. Most (57.8%) of respondents who participated in this survey were in youth (20 - 40 years old). Although 82.9% of respondents reported recent significant to extensive tsetse bites, only 27.8% were aware of repellent technology with only 2% having used the repellent against tsetse fly bites. Selection criteria for repellent product primarily focused on quality (15.7%) and effectiveness of the product against tsetse fly bites (14.0%) followed by ease of application (7%) and price (5%). Approximately 41.1% of the respondents expressed their willingness to purchase the repellent monthly or annually with many (49%) of livestock keepers willing to spend less than 1USD and a smaller portion (13%) from the hospitality industry willing to spend 3 - 4 USD. Regarding user feedback, the masked NRB was rated as easy to apply by 74% of the respondents, while the unmasked NRB was considered easy to use by 10%.68 of farmers. Some of the farmers highlighted the good quality of the neck and tail prototypes (36%), while others specifically rated the neck prototype as both of good quality and easy to use (19.42%). However, repellency of the NRB to tsetse flies received the lowest score (6.8%) by farmers but rated at 84% by individuals who used masked-version of the repellent. Conclusively, this study provides valuable insights into potential market for NRB in Tanzania,

emphasizes the need to raise awareness about repellent technology and its benefits including enhancing sterile insect technique (SIT), and improve quality to enhance customer adoption and satisfaction.

Keyword: Tsetse, repellent, waterbuck scents, trypanosomosis, Tanzania

5.06

SOCIO-ECONOMIC BURDEN OF AFRICAN ANIMAL TRYPANOSOMIASIS IN KENYA

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Tsetse-transmitted Animal African Trypanosomosis (AAT) is a disease of economic importance to integrated crop-livestock development in Sub-Saharan Africa (SSA). Despite the introduction of innovative initiatives to manage the disease in the last two decades, progress toward control of AAT has been limited. Implemented in the framework of the COntrolling and progressively Minimizing the Burden of Animal Trypanosomosis (COMBAT) project, the current study seeks to assess the socioeconomic burden of AAT in Kenya. The study was conducted in Busia and Homabay Counties of Kenya. The two counties were selected based on high tsetse infestation and AAT prevalence in Kenya of over 50%. Based on the previous data collection efforts in the two counties, three sites in each county categorized as low, medium, and high tsetse infestation/AT prevalence areas were identified, from which multistage sampling technique was used to select Sub-counties, Wards, and villages. After selecting the villages, 435 cattle-keeping households were selected using systematic random sampling for the interviews. The preliminary results show a high economic burden of AAT, with farmers incurring the significant cost of livestock production from tsetse and AAT management, as well as high livestock mortality from the disease. The cost of production includes the cost of disease prevention and treating sick animals, purchasing supplementary diets for the affected animals, loss of milk, and traction power among other costs. The disease also causes abortions, increases calving intervals, and reduces the lactation period, and the market value for the animals. Reduced traction power reduces the income generated from hiring oxen for draft power but also affects the household's capacity to utilize the available land for cultivation and thus the potential for food production and security within the affected households. The study results contribute to evidence-based prioritization of the tsetse and AAT control interventions at the national, but also continental levels. The economic burden findings also enhance awareness, raising efforts as well as adequate commitment by policymakers and other decision-makers to eradicating AAT in SSA.

5.07

AFRICAN TRYPANOSOMIASIS CONTROL METHODS Vs FINANCIAL NET RETURN

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ABSTRACT

The effectiveness of trypanosomiasis control methods has been reported in several studies with financial analyses of estimated costs of control based on retrospective data. This study was a prospective cohort study using cumulative incidence data to assess current treatments for African animal trypanosomiasis (AAT) used in Zambia and their financial return in controlling the disease in cattle. The study was undertaken between February 2019 and March 2020 in cattle (n = 227) using four treatment groups (Berenil inoculation, Samorin inoculation, Cyfluthrin pour-on and Cypermethrin treated targets) in Mambwe district of Eastern Zambia. Monthly incidence rates were calculated using ITS-PCR as a diagnostic test. The financial return for the four treatments under study, were quantified using a stochastic partial budget analysis. Endemic trypanosome prevalence rates for the Berenil inoculation (78%, n = 39, 95%CI = 66.52-89.48), Samorin inoculation (46%, n = 23, 95%CI = 32.19-59.81), Cyfluthrin pour-on (82%, n = 41, 95%CI = 71.35-92.65) and Cypermethrin targets (98%, n = 49, 95%CI = 94.12-101.88) were higher for all four treatment groups compared to incidence rates at the end of the treatment period (18%, n = 9, 95%CI = 7.35-28.65; 8%, n = 4, 95%CI 0.48-15.52; 2%, n = 1, 95%CI -1.88-5.88; 16%, n = 8, 95%CI = 5.84-26.16), respectively. The Cypermethrin target group showed a greater impact on incidence than the Cyfluthrin pour-on, Samorin inoculation, and Berenil inoculation treatment groups, respectively (p value < 0.01). The Samorin inoculation group (ZMW 910.00) had a net return greater than the Cypermethrin target (ZMW 849.11), the Berenil inoculation group (ZMW 636.36) and the Cyfluthrin pour-on group (ZMW 477.71). Additional returns due to births from lower mortality rates had the highest effect on the net return for the Samorin inoculation, Berenil inoculation and Cyfluthrin pour-on groups while, costs no longer incurred due to deaths had the highest effect on the net return for the Cypermethrin target group. The Samorin group showed to be the

most cost-effective method for controlling AAT for small scale-farmers while the Cypermethrin target may be the most appropriate option for large-scale government sponsored vector control programmes.

Keywords: African trypanosomiasis, Control, Financial returns, Incidence, Remote communities, Zambia

5.08

A GEOSPATIAL MODELING APPROACH TO PREDICT THE SPATIAL DISTRIBUTION OF TSETSE FLY (GLOSSINA SPP.) HABITATS IN KENYA

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Abstract:

The neglected tropical diseases of animal African trypanosomiasis (AAT) and human Africa trypanosomiasis (HAT) instigated by tsetse fly (Glossina spp.) have disproportionately impacted the livestock production systems in sub-Saharan African countries threatening food and nutrition security. In Kenya, 38 out of 47 counties are largely under the influence of the prevalent AAT which causes high livestock morbidity and mortality rates. Location-specific interventions are paramount to suppress AAT risks amid decreased resources for effective control in the country. Hence, this study aimed to predict suitable tsetse fly habitat distribution in Kenya using satellite-based environmental variables. We applied a generalized linear model (GLM) using 1479 tsetse fly occurrence records and 39 environmental variables. The GLM model attained an accuracy of 0.87 in predicting suitable tsetse habitats at a landscape scale. The variable contribution analysis revealed that soil moisture, normalized difference vegetation index, land surface temperature, sand content and cattle density had the highest influence in simulating tsetse fly habitat distribution. Our results were used to guide tsetse fly surveillance operations in Kenya.

Keywords: Species distribution; vector-borne disease; animal health; Kenya

5.09

RECENT RESEARCH ON LIVESTOCK OWNERS' ATTITUDES AND UNDERSTANDING OF TSETSE FLY AND TRYPANOSOMOSIS CONTROL IN NIGERIA'S FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA

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In the Federal Capital Territory of the three areas council of Gwagwalada, Kwali, and Abaji, a pilot survey using a structured questionnaire was conducted to ascertain the knowledge and attitudes of cattle owners regarding the prevention of tsetse fly and trypanosomosis. This was done to ascertain the different perspectives of these cattle owners regarding the prevention of tsetse fly and trypanosomosis in the Federal Capital Territory, Abuja.Nigeria. Few people believe that tsetse fly and trypanosomosis exist, recognize that animal trypanosomosis is a problem, and know how to control it in the Federal Capital Territory of Abuja, Nigeria. A total of 81 cattle owners were chosen at random and interviewed. Some cattle owners are aware of the use of tsetse fly traps, isometamidium chloride, diminazene aceturate, and pour-on applications. The differences between awareness and application were highly significant for tsetse fly trapping and pour-on applications but not for the use of isometamidium chloride and diminazene aceturate, despite the fact that only a small percentage of cattle owners used these methods. 97.5 percent of cattle owners said they would be willing to take part in future management programs. The four most popular control methods, in order of importance, were: government-provided fly traps that cattle owners maintained; cattle owners' labor contributions for trap deployment; self-financing of trypanocidal medications; and self-financing of pour-on insecticide. It is addressed the control methods to choose in order to get cattle owners to participate fully.

Keywords: tsetse fly, trypanosomosis control, in the Federal Capital Territory, Abuja , Nigeria

5.10

ONE HEALTH APPROACHES FOR SUSTAINABLE TRYPANOSOMIASIS CONTROL AND ELIMINATION

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Trypanosomiasis, caused by the Trypanosoma parasite, poses a significant health threat to humans, animals, and wildlife in various regions of the world. Most notably are the tropical areas with underdeveloped communities plagued with ease of contact between transmitting agents and humans and animals with attendant poor health care. The complex nature of the disease requires a comprehensive and integrated approach that encompasses human and veterinary health sectors, as well as wildlife conservation efforts. This review critically analyzes the One Health approaches implemented for trypanosomiasis control, highlighting the importance of collaboration, coordination, and knowledge-sharing among different disciplines. It explores the interconnections between human, animal, and environmental health, and examines the impact of integrated strategies on achieving sustainable control and elimination of trypanosomiasis. Strategies as knowledge sharing and capacity building initiatives, vector control strategies, insecticide treated traps, aerial spraying, diagnostic methods and surveillance, challenges and future directions among others were critically described.

5.11

EVALUATION OF TSETSE AND TRYPANOSOMIASIS TRENDS AND LAND USE CHANGES BETWEEN 2012 TO 2022 IN BARINGO COUNTY, KENYA

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ABSTRACT

The key economic activity in the Arid and Semi-Arid Lands (ASAL) of Baringo is livestock production, particularly within the Bogoria Tsetse belt. However, Tsetse infestation and its transmission of trypanosomiasis to livestock (African Animal Trypanosomiasis) in the region have dealt a major draw-back in the livestock development and tourism sector. To overcome the negative impacts of Trypanosomiasis on sustainable agriculture and rural development, Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC) embarked on intervention measures including entomological surveys using biconical traps, deployment of insecticide impregnated targets, epidemiological monitoring and treatment of infected animals, installation of insecticide-treated livestock protective fences (LPF) within zero grazing units and supporting affected communities with insecticides for use in livestock dipping/spraying. This study intends to present trends from data on tsetse population densities /and trypanosomiasis infection cases, for a period of ten (10) years 2012–2022) and the land use changes that have been witnessed. As a result, tsetse densities have been progressively suppressed over the years to less than 1 fly per trap per day (FTD) owing to the concerted control efforts. Success stories on intensified livestock and agricultural activities have been recorded in areas within the Bogoria National Reserve notably Emsos, Nyalilbuch, Loboi, and its environs. Diversification of the land uses has also been recorded in these areas that had previously been unexploited due to tsetse infestation.

5.12

EVOLUTION OF THE APPARENT DENSITY OF THE TSETSE POPULATION IN THE FRAMEWORK AREA OF THE PROJECT FOR THE SUSTAINABLE MANAGEMENT OF ENDEMIC RUMINANT LIVESTOCK (PROGEBE)

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SUMMARY

The prospective study of the evolution of the apparent density of tsetse in the PROGEBE supervision area is a contribution to the search for a strategy to control bovine trypanosomosis in the Sudano-Guinean area of Mali in a context of degradation of the vegetation. Entomological monitoring of tsetse in 3 checks was carried out in 2012 at 4 sites: Tousséguéla, Manankoro and Madina diassa (Sikasso region) and Sagabary (Kayes region) in July (D0), August (check 1), September (control 2) and October (control 3). Out of 25 fixed control points on the 4 sites, 9 were positive on D0, 16 on control 1, 21 on control 2 and 25 on control 3. D0, 4.44 at control 1, 5.25 at control 2 and 12.76 at control 3. The most infested sites were Sagabary and Manankoro. In 1997, Djiteye et al obtained at the Tienfala deposit, 21.7 G.palpalis gambiensis / trap / day at the end of the rainy season and 5.23 in the hot dry season.

Keywords: Evolution, Apparent Density, Gossines, Zone, PROGEBE, Mali

5.13

ASSESSMENT OF KNOWLEDGE, CULTURAL PRACTICES AND SOCIO-ECONOMIC IMPACT OF TSETSE FLY AND TRYPANASOMIASIS(T&T) IN FIVE COMMUNITIES OF GOMBE STATE, NORTH-EASTERN, NIGERIA.

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Abstract

A study was conducted in four Local Government Areas (LGA) of Gombe State to assess the socio-economic impact of (T&T) in ruminants. Also, the level of awareness, knowledge and the cultural practices of herders as it relates to (T&T) was acquired by using structured questionnaires, oral interview and focus group discussions. A total of 103 respondents were selected using purposive sampling technique which included; community heads, household heads and pastoralists, crop farmers, veterinary personnel and LGA officials. The respondents indicated that different biting flies exist in the study area. Although they are not conversant with the name "tsetse fly" but (97.1%) of the respondents acknowledge the fly is locally known as "Kudan Tsando ", "Kudan Shanu", "Lodi" among others. Most respondents (between 59.2% - 95.1%) were also able to identify the image of tsetse fly from the advocacy materials acknowledging to have been bitten by the fly while grazing their animals at the riverside. Some of the respondents (59.2%) were not aware of tsetse fly is harmful to both humans and animals. The heeders representing (68%) know about the disease (Sammore) and its symptoms, also (32%) of the cattle owners do not know if the symptoms are caused by Trypanosomiasis. When asked about treatments, (29.1%) of them did engage in self-medication and cultural practices to repel the tsetse fly away from their animals. The monthly treatment of trypanasomiasis and other infections is estimated at N 22,000.00 Naira per household (US$48.) on preventive and curative drugs.

Keywords: Gombe; Tsetse; Animal African Trypanosomiasis; Economic Impact; Knowledge; Assessment



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