

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
INSTITUTO DE CIÊNCIAS BÁSICAS DA SAÚDE
CURSO DE ESPECIALIZAÇÃO EM MICROBIOLOGIA CLÍNICA

Rejane Barcelos Souza

**PESQUISA DE *CRYPTOSPORIDIUM* SPP. EM EQUINOS (*Equus caballus*) DE UMA
CAVALARIA NO SUL DO BRASIL**

Porto Alegre

2023

Rejane Barcelos Souza

**PESQUISA DE *CRYPTOSPORIDIUM* SPP. EM EQUINOS (*Equus caballus*) DE UMA
CAVALARIA NO SUL DO BRASIL**

Trabalho de conclusão de curso de especialização apresentado ao Instituto de Ciências Básicas da Saúde da Universidade Federal do Rio Grande do Sul como requisito parcial para a obtenção do título de Especialista em Microbiologia Clínica.

Orientadora: Prof^ª. Dr^ª. Marilise Brittes Rott
Coorientador: Prof. Dr. João Fábio Soares

Porto Alegre

2023

CIP - Catalogação na Publicação

Souza, Rejane Barcelos
Pesquisa de *Cryptosporidium* spp. em equinos (*Equus caballus*) de uma cavalaria no sul do Brasil / Rejane Barcelos Souza. -- 2023.
41 f.
Orientadora: Marilise Brittes Rott.

Coorientador: João Fábio Soares.

Trabalho de conclusão de curso (Especialização) --
Universidade Federal do Rio Grande do Sul, Instituto
de Ciências Básicas da Saúde, Microbiologia Clínica,
Porto Alegre, BR-RS, 2023.

1. *Equus caballus*. 2. *Cryptosporidium*. 3.
Criptosporidiose. 4. Saúde pública. I. Rott, Marilise
Brittes, orient. II. Soares, João Fábio, coorient.
III. Título.

Elaborada pelo Sistema de Geração Automática de Ficha Catalográfica da UFRGS com os dados fornecidos pelo(a) autor(a).

AGRADECIMENTOS

À minha orientadora prof^a Marilise Brittes Rott, ao meu coorientador prof. João Fábio Soares que aceitaram de pronto me conduzir em mais este caminho.

Ao meu marido José Renato, por estar sempre ao meu lado me estimulando a seguir e nunca desistir, por entender meus momentos de ausência, idas ao ICBS, estresse e nunca me deixar sozinha. Por todos os *hot dogs* que dividimos no pátio do ICBS e Psicologia quando eu tinha aula aos sábados e não tinha como vir em casa.

À minha mãe Eva Regina, que sempre fica muito feliz, é torcida declarada e realizada ao ver a filha estudando, que muito me incentivou a buscar sempre mais, à minha irmã Rosane que divide a sala de trabalho comigo e me deu inúmeras caronas até o laboratório de Protozooses quando eu não podia caminhar sozinha. Aos meus amados, filho Lucas e meu sobrinho Diego, que estavam sempre por perto dando aquele chamego bom, o que me fazia relaxar.

Aos colegas de trabalho, que nunca descreditaram de mim e sempre me estimularam a buscar por mais conhecimento, em especial aos Médicos Veterinários Daiene Loss, Tatiane Mottin e Flávia Umpierre e não menos importantes Cláudia Faraco, Suzana Cheuiche, Irene Breitsameter, Nina Isabel, Eglete Pacheco, Luciane Vieira, Luciana Oliveira, Marianne Lamberts, Mauro Machado e meu amor amigo Fábio Teixeira. À mala e filho do coração que eu amo muito Giordano Gianotti, que ficava me zutando as ideias e era o responsável por servir o mate e me azedar a paciência.

Às tantas colegas da turma de Especialização em Microbiologia Clínica, que foram muito parceiras, pelas boas risadas, lanchinhos em aula, auxílio para resolvermos temas e exercícios, em especial a Mariana Falkembach minha sempre dupla e Michelle Pavan que me salvaram em várias.

A todos os colegas do laboratório de Protozooses/FAVET/UFRGS, que tão bem me acolheram e acolhem desde a graduação, permitindo que eu siga nos parasitos aprendendo sempre mais um pouco, pois o aprendizado não acaba jamais, ele apenas se renova. Ao Vinícius Baggio em especial que me aturou cheia de dúvidas, sempre atencioso e solícito, me salvou de várias com o microscópio e as análises das lâminas.

E a todas as pessoas que de alguma forma, e em algum momento estiveram presentes e somaram para minha formação. Dedico a vocês mais esta conquista.

RESUMO

Este estudo tem como objetivo fazer uma busca por hospedeiros de *Cryptosporidium* spp., em equinos (*E. caballus*) sob condições sanitárias controladas de uma cavalaria na cidade de Porto Alegre/RS. As condições destes equinos são importantes para corroborar estudos sobre potenciais reservatórios, sua patogênese e relevância para a saúde pública. A presença de infecção ou a exposição destes indivíduos a *Cryptosporidium* spp. foi investigada utilizando-se dois métodos de pesquisa: inicialmente as amostras foram fixadas pela técnica de centrífugo-sedimentação de Ritchie (1948) e posteriormente o método da coloração de Ziehl-Neelsen modificada (1981) a quente. *Cryptosporidium* spp. são cada vez mais reconhecidos como causadores de doenças diarreicas em todo o mundo, independente de faixa etária, e a doença apresenta elevados índices de morbidade e mortalidade entre animais e humanos. As fontes e vias de transmissão são inúmeras, envolvendo a disseminação zoonótica e antroponótica, que são facilitadas pela resistência do parasito protozoário aos diversos tipos de desinfetantes e sanitizantes. O parasito está bem adaptado para infectar humanos e animais por vias de transmissão diretas, transmissão pela água, por alimentos e de pessoa para pessoa. A criptosporidiose é considerada pela Organização Mundial da Saúde (OMS) como uma doença negligenciada e medidas profiláticas são recomendadas, incluindo boa higiene, promoção de boas práticas como lavar as mãos com frequência e evitar contato com fezes de animais. Estas são medidas fundamentais para prevenir sua propagação, pois o parasito se espalha principalmente por transmissão fecal-oral. Investir em saneamento básico, utilizar metodologias próprias para eliminação de oocistos e a garantia de higiene pessoal, objetivam minimizar a disseminação do parasito e são importantes para o controle dessas infecções. As pessoas com sistema imunológico comprometido, como pacientes com HIV/AIDS ou transplantados, correm maior risco de desenvolver a criptosporidiose e devem tomar precauções adicionais, como evitar o contato com animais infectados e beber água tratada ou fervida. A sintomatologia, quando presente, caracteriza-se por diarreia aquosa, desidratação, dores abdominais, perda de peso e pode levar o indivíduo à morte, principalmente as crianças, idosos e os imunocomprometidos. A identificação de potenciais reservatórios para criptosporidiose, ampliar o conhecimento em áreas-chave, etiologia, transmissão, epidemiologia e interações com o hospedeiro ajudará a reduzir o número de casos da infecção humana. Além disso, manter estudos frequentes e compilar dados é muito importante, para que se tenha mais informações a fim de identificar os possíveis hospedeiros que circulam entre os humanos.

Palavras-chave: *Equus caballus*; *Cryptosporidium*; Criptosporidiose; Saúde pública.

ABSTRACT

*This study aims to carry out a search for hosts of *Cryptosporidium* spp., in horses (*E. caballus*) under controlled sanitary conditions of a stable in the city of Porto Alegre/RS. The conditions of these horses are important to support studies on potential reservoirs, their pathogenesis and relevance to public health. The presence of infection or exposure of these individuals to *Cryptosporidium* spp. was investigated using two research methods, initially the samples were fixed by the Ritchie (1948) centrifugal-sedimentation technique and later by the hot Ziehl-Neelsen (1981) staining method. *Cryptosporidium* spp. are increasingly recognized as the cause of diarrheal diseases worldwide regardless of age group and the disease has a high morbidity and mortality rate among animals and humans. The sources and routes of transmission are numerous, involving zoonotic and anthroponotic dissemination, which are facilitated by the resistance of the protozoan parasite to different types of disinfectants and sanitizers. The parasite is well adapted to infect humans and animals by direct transmission routes, waterborne, foodborne, and person-to-person transmission. Cryptosporidiosis is considered by the World Health Organization (WHO) as a neglected disease and prophylactic measures are recommended, including good hygiene, promoting good practices such as washing hands frequently and avoiding contact with animal feces. These are key measures to prevent its spread, as the parasite spreads mainly through fecal-oral transmission. Investing in basic sanitation, using specific methodologies for eliminating oocysts and ensuring personal hygiene aims to minimize the spread of the parasite and are important for controlling infections. People with compromised immune systems, such as HIV/AIDS patients or transplant recipients, are at greater risk of developing cryptosporidiosis and should take additional precautions, such as avoiding contact with infected animals and drinking treated or boiled water. The symptomatology, when present, is characterized by watery diarrhea, dehydration, abdominal pain, weight loss and can lead the individual to death, especially children, the elderly and the immunocompromised. Identifying potential reservoirs for cryptosporidiosis, expanding knowledge in key areas, etiology, transmission, epidemiology, and host interactions will help to reduce the number of cases of human infection. In addition, maintaining frequent studies and compiling data is very important, so that more information is available to identify the possible hosts that circulate among humans.*

Keywords: *Equus caballus*; *Cryptosporidium*; Cryptosporidiosis; Public health.

SUMÁRIO

1	INTRODUÇÃO.....	6
2	OBJETIVOS.....	9
2.1	OBJETIVO GERAL.....	9
2.2	OBJETIVOS ESPECÍFICOS.....	9
3	ARTIGO CIENTÍFICO.....	10
4	CONCLUSÃO E PERSPECTIVAS.....	24
	REFERÊNCIAS.....	25
	APÊNDICE – FICHA DE AVALIAÇÃO DOS EQUINOS.....	32
	ANEXO – NORMAS DE PUBLICAÇÃO DA REVISTA DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL.....	33

1 INTRODUÇÃO

Cryptosporidium (Tyzzer, 1907) foi descoberto em camundongos na década de 1980. Este parasito protozoário intracelular despertou o interesse na atenção veterinária e humana por seu importante papel na síndrome da imunodeficiência adquirida (SIDA) (Casemore, Sands e Curry, 1985). O parasito pertence ao Filo Miozoa (Cavalier-Smith, 1987), Classe Gregarinomorpha (Glassé, 1953), Família Cryptosporidiidae (Leger, 1911) e gênero *Cryptosporidium*. As espécies de *Cryptosporidium* são, cada vez mais, objeto de estudo em virtude da sua associação com as doenças diarreicas agudas e crônicas (Carvalho, 2009) e pelo protagonismo desse organismo como causador da doença entérica em humanos e outros animais (Morgan et al., 1999). Esses parasitos apresentam localização intracelular e extracitoplasmática ou epicelular (Marcial e Madara, 1986); são parasitos protozoários de mucosa do epitélio respiratório, intestinal ou gástrica de vários vertebrados.

Cryptosporidium spp. pode parasitar uma gama de animais, incluindo répteis, aves, peixes e mamíferos como animais de fazenda, em especial ovinos, bovinos e animais de companhia como gatos, cães e cavalos (Santín, 2013). A criptosporidiose foi observada pela primeira vez em perus no ano de 1955 (Slavin, 1955), décadas depois, em 1970 e 1980, infecções por *Cryptosporidium* spp. foram relatadas em ruminantes neonatos (Panciera, Thomassen e Garner, 1971, Mason, Hartley e Tilt, 1981, Angus, Tzipori e Gray, 1982).

Em animais de companhia, as infecções por *Cryptosporidium* spp. são assintomáticas, mas já foi relatada a doença clínica (em casos graves) em cães, gatos e cavalos, concomitante com infecções ocasionais (Santín e Trout, 2007). Entre os equinos (*E. caballus*), a criptosporidiose normalmente é causada por *C. parvum* e, como nos outros animais, a imunodeficiência aliada a idades extremas são fatores de risco para o desenvolvimento de infecções sintomáticas (Xiao et al., 2004, Majewska et al., 2004). No Brasil temos poucos estudos sobre *Cryptosporidium* spp. em cavalos (*E. caballus*) (Inácio et al., 2017, Ribeiro et al., 2022) e, até o momento, os estudos no diagnóstico desse parasito protozoário foram direcionados a bovinos, ovinos e animais de companhia cães e gatos.

A infecção por *Cryptosporidium* spp. é cada vez mais reconhecida como uma das causas de doenças diarreicas em todo o mundo e em todas as faixas etárias. Anualmente, as doenças diarreicas causam até 1,6 milhão de mortes em todo mundo e a criptosporidiose causa até 20% de todos os casos de diarreia em crianças nos países em desenvolvimento (Helmy e Hafez 2022). *Cryptosporidium* é responsável também por mais de 8 milhões de casos de doenças transmitidas por alimentos em todo mundo anualmente (Ryan et al., 2018). O acometimento da

infecção ocorre principalmente pela ingestão dos oocistos, durante o contato direto com as fezes humanas ou de animais, por exposição através de um veículo de transmissão, como água contaminada, alimentos ou fômites contaminados. Também ocorre a ciclagem assexuada no trato gastrointestinal do hospedeiro, o que resulta na proliferação do parasito protozoário mesmo que o ciclo sexual seja interrompido. Nesse ciclo sexual, há a eliminação de oocistos esporulados nas fezes, muitas vezes em grande número. Os oocistos encontrados nas fezes têm paredes espessas e são extremamente resistentes a muitas pressões do ambiente. Estes oocistos sobrevivem bem em ambientes úmidos e são resistentes a muitos desinfetantes, incluindo o cloro, principalmente em concentrações normais (Chalmers e Davies, 2010).

Os grupos de pessoas consideradas de alto risco que podem ser expostas ao *Cryptosporidium* incluem: (1) crianças em creches, (2) idosos (75 anos ou mais), (3) cuidadores de crianças e adultos que trocam fraldas, (4) pais ou acompanhantes de crianças infectadas, (5) viajantes de/para áreas endêmicas, (6) pessoas que manuseiam animais ou pássaros infectados, (7) nadadores que engolem água contaminada, (8) pessoas que foram sexualmente expostas a fezes humanas, (9) pessoas que cuidam de outras pessoas infectadas, (10) pessoas que bebem água não tratada, como mochileiros, caminhantes e campistas (Centers for Disease Control and Prevention, 2021), (11) receptores de transplantes de órgãos e (12) outros grupos ocupacionais associados, como veterinários, tratadores de animais (varredores, vacinadores, equipe de debicagem, animais de estimação, tutores e caçadores) (Helmy e Hafez, 2022).

Atualmente, considera-se que espécies como *Cryptosporidium felis*, *Cryptosporidium meleagridis* e *Cryptosporidium cuniculus* (Puleston et al., 2014) e um parasito de coelhos possam ser causadores de surtos, além do *Cryptosporidium parvum*, em humanos e animais. Nos grupos de *Cryptosporidium* spp. causadores de surtos, ainda temos as espécies *Cryptosporidium hominis* e *Cryptosporidium canis* (Xiao, 2010, Xiao e Ryan, 2007, Chalmers et al., 2009). Outras espécies e genótipos ainda não são conhecidos como patogênicos para o ser humano, necessitando mais estudos e investigações.

De acordo com o relatório epidemiológico anual de 2014 do ECDC (European Centre for Disease Prevention and Control, 2014), a identificação de surtos de criptosporidiose depende de diagnóstico e vigilância precisos. A falta de diagnóstico laboratorial é um relevante fator para subnotificação de surtos e elemento importante para atividades de aconselhamento para a prevenção da propagação (European Centre for Disease Prevention and Control, 2014).

A doença causada por *Cryptosporidium* spp. varia dos graus leve a moderado ou grave, levando em conta o estado nutricional, sítio onde ela ocorre e estado imunológico do paciente. A infecção humana pode resultar da transmissão zoonótica (Xiao, 2010). As infecções por

Cryptosporidium em humanos geralmente resultam em sintomas gastrointestinais, principalmente diarreia úmida profusa. Alguns pontos-chave sobre as infecções por *Cryptosporidium* em pessoas saudáveis e com sistema imunológico saudável, a infecção pode causar além da diarreia úmida profusa, cólicas abdominais, náuseas e vômitos. Esses sintomas geralmente são autolimitados, o que significa que eles geralmente desaparecem por conta própria após algumas semanas (Santín, 2020). Em pacientes imunocompetentes, a criptosporidiose é uma doença autolimitada, porém, a criptosporidiose crônica acontece quando o sistema imune do hospedeiro não consegue eliminar o parasito. Para os imunocomprometidos, como bebês, pessoas em processo adiantado de desnutrição ou portadores de doenças pré-existentes (por exemplo, infecção por HIV não tratada) os sintomas podem ser prolongados, graves e até mesmo fatais (Checkley et al., 2015).

O gênero *Cryptosporidium* inclui várias espécies que podem infectar humanos e outros animais. Entre essas espécies, *C. hominis* e *C. parvum* as mais frequentemente detectadas em infecções humanas, o *C. hominis* é altamente adaptado a infectar os seres humanos e está associado a surtos em ambientes comunitários (Khan et al., 2019). O *C. parvum* embora possa infectar humanos está amplamente associado a infecções em animais, no entanto, as pessoas que tenham contato direto com animais infectados como agricultores ou trabalhadores da indústria de laticínios ficam mais propensos (Dărăbuș et al., 2023). É importante prevenir a transmissão de doenças, reduzindo e eliminando oocistos nos ambientes, isolar os animais e desinfetar as superfícies (Helmy e Hafez, 2022).

2 OBJETIVOS

2.1 OBJETIVO GERAL

Investigar a ocorrência de *Cryptosporidium* spp. em amostras de fezes de cavalos (*E. caballus*) estabulados através de coleta após evacuação e, desta maneira, fazer inferência sobre a sanidade destes equinos.

2.2 OBJETIVOS ESPECÍFICOS

O objetivo deste estudo foi investigar se animais de trabalho saudáveis estabulados com acompanhamento de médico veterinário e tratadores, abrigam infecções parasitárias zoonóticas (Overgaaauw et al., 2009). Pesquisar a presença de *Cryptosporidium* spp. em equinos (*E. caballus*) é importante para se obter dados sobre as condições destes animais e rastrear potenciais hospedeiros e, para tanto, pretende-se:

- a) Analisar a presença de *Cryptosporidium* spp. em fezes de equinos (*E. caballus*);
- b) Correlacionar com sinais clínicos e tratamento prévio;
- c) Identificar equinos (*E. caballus*) como potenciais hospedeiros de *Cryptosporidium* spp.

3 CONCLUSÃO E PERSPECTIVAS

Conclui-se com base nas análises dos registros recebidos e nas informações obtidas nas planilhas individuais que mesmo estes equinos (*E. caballus*) mantendo contato com cães pombas e roedores, ainda assim se mantêm isentos de infecção pelo parasito. Além disso, os resultados podem variar dependendo de diversos fatores, como o tipo específico do parasito em questão, a resistência imunológica dos animais envolvidos, as condições ambientais e a extensão do contato com outros animais.

Este trabalho fornece uma visão ampla da importância clínica da infecção por *Cryptosporidium* spp. em animais de trabalho em uma cavalaria no sul do Brasil. Entretanto, são necessárias análises mais abrangentes e maior número amostral com cavalos (*E. caballus*) para confirmar nossos achados.

A criptosporidiose é uma doença reconhecida mundialmente em humanos. Das espécies conhecidas e válidas, apenas o *C. parvum* é comum aos humanos e outros mamíferos. Muitos estudos são realizados, para continuar a monitorar e entender a situação da infecção por *Cryptosporidium* spp. em cavalos (*E. caballus*) e em seu ambiente. Portanto, seguir com pesquisas nesse sentido é fundamental para determinar a prevalência do parasito em hospedeiros diversos e elucidar a epidemiologia das infecções, pois os animais são potenciais reservatórios para as infecções humanas. Esses estudos ajudam a reduzir a disseminação da infecção, protegendo tanto os cavalos (*E. caballus*) quanto as pessoas que trabalham com eles, especialmente para os cocheiros e tratadores que têm contato próximo com esses animais.

O aumento do interesse em *Cryptosporidium* spp. pela Medicina Veterinária está diretamente ligado à necessidade de proteger a saúde pública, garantir a segurança da água potável e implementar medidas eficazes de prevenção e controle da criptosporidiose em animais e humanos.

Ao entender melhor a epidemiologia e a ecologia de *Cryptosporidium* spp. em animais, os médicos veterinários podem contribuir para o desenvolvimento de estratégias eficazes de prevenção e controle da criptosporidiose. Isso inclui medidas como a adoção de boas práticas de higiene, implementação de protocolos de capacitação, educação dos proprietários de animais sobre os riscos e a importância do monitoramento regular da qualidade da água.

Enfim, mais estudos devem ser desenvolvidos com cavalos (*E. caballus*) e outros animais de companhia, trabalho ou recreação para ampliar o conhecimento e promover o avanço das pesquisas sobre o tema.

REFERÊNCIAS

Anguish LJ, Ghiorse WC. Computer-assisted laser scanning and video microscopy for analysis of *Cryptosporidium parvum* oocysts in soil, sediment, and feces. *Appl Environ Microbiol* [Internet]. 1997 Feb [citado em 15 jun. 2023];63(2):724-33. Disponível em: <https://doi.org/10.1128/aem.63.2.724-733.1997>.

Angus KW, Tzipori S, Gray EW. Intestinal lesions in specific-pathogen-free lambs associated with a *Cryptosporidium* from calves with diarrhea. *Vet Pathol* [Internet]. 1982 Jan [citado em 7 jun. 2022];19(1):67-78. Disponível em: <https://doi.org/10.1177/030098588201900110>.

Bouzig M, Hunter PR, Chalmers RM, Tyler KM. *Cryptosporidium* pathogenicity and virulence. *Clin Microbiol Rev* [Internet]. 2013 Jan [citado em 12 jun. 2023];26(1):115-34. Disponível em: <https://doi.org/10.1128/CMR.00076-12>.

Braccini GL, Silva NR, Chaplin E, Mattos RC, Araújo FA. *Cryptosporidium parvum* em equinos no município de Taquara, RS, Brasil. *Arq Fac Vet UFRGS*. 1994;22:37-42. Portuguese.

Caffara M, Piva S, Pallaver F, Iacono E, Galuppi R. Molecular characterization of *Cryptosporidium* spp. from foals in Italy. *Vet J* [Internet]. 2013 Nov [citado em 12 jun. 2023];198(2):531-3. Disponível em: <https://doi.org/10.1016/j.tvjl.2013.09.004>.

Cama VA, Bern C, Sulaiman IM, Gilman RH, Ticona E, Vivar A, et al. *Cryptosporidium* species and genotypes in HIV-positive patients in Lima, Peru. *J Eukaryot Microbiol* [Internet]. 2003 [citado em 12 jun. 2023];50 Suppl:531-3. Disponível em: <https://doi.org/10.1111/j.1550-7408.2003.tb00620.x>.

Carvalho TT. Estado atual do conhecimento de *Cryptosporidium* e *Giardia*. *J Trop Pathol* [Internet]. 2009 [citado em 7 jan. 2023];38(1):1-16. Portuguese. Disponível em: <https://doi.org/10.5216/rpt.v38i1.6203>.

Casemore DP, Sands RL, Curry A. *Cryptosporidium* species a “new” human pathogen. *J Clin Pathol* [Internet]. 1985 Dec [citado em 5 maio 2022];38(12):1321-36. Disponível em: <http://dx.doi.org/10.1136/jcp.38.12.1321>.

Centers for Disease Control and Prevention. Parasites - *Cryptosporidium* (also known as “Crypto”): general information for the public [Internet]. Atlanta: CDC; 2021 [citado em 20 set. 2022]. Disponível em: https://www.cdc.gov/parasites/crypto/general-info.html#anchor_1612796577394.

Chalmers RM, Davies AP. Minireview: clinical cryptosporidiosis. *Exp Parasitol* [Internet]. 2010 [citado em 1 jun. 2022];124(1):138-46. Disponível em: <https://doi.org/10.1016/j.exppara.2009.02.003>.

Chalmers RM, Robinson G, Elwin K, Hadfield SJ, Xiao L, Ryan U, et al. *Cryptosporidium* rabbit genotype, a newly identified human pathogen [letter]. *Emerg Infect Dis* [Internet]. 2009 May [citado em 1 jun. 2022];15(5):829-30. Disponível em: <https://doi.org/10.3201/eid1505.081419>.

- Checkley W, White Jr AC, Jaganath D, Arrowood MJ, Chalmers RM, Chen XM, et al. A review of the global burden, novel diagnostics, therapeutics, and vaccine targets for cryptosporidium. *Lancet Infect Dis* [Internet]. 2015 Jan [citado em 25 ago. 2022];15(1):85-94. Disponível em: [https://doi.org/10.1016/s1473-3099\(14\)70772-8](https://doi.org/10.1016/s1473-3099(14)70772-8).
- Chen XM, Keithly JS, Paya CV, LaRusso NF. Criptosporidiosis. *N Engl J Med* [Internet]. 2002 May 30 [citado em 12 jun. 2023];346(22):1723-31. Disponível em: <https://doi.org/10.1056/NEJMra013170>.
- Cole DJ, Snowden K, Cohen ND, Smith R. Detection of *Cryptosporidium parvum* in horses: thresholds of acid-fast stain, immunofluorescence assay, and flow cytometry. *J Clin Microbiol* [Internet]. 1999 Feb [citado em 17 jul. 2023];37(2):457-60. Disponível em: <https://doi.org/10.1128/JCM.37.2.457-460.1999>.
- Couso-Pérez S, de Limia FB, Ares-Mazás E, Gómez-Couso H. First report of zoonotic *Cryptosporidium parvum* GP60 subtypes IIaA15G2R1 and IIaA16G3R1 in wild ponies from the northern Iberian Peninsula. *Parasitol Res* [Internet]. 2020 Jan [citado em 12 jun. 2023];119(1):249-54. Disponível em: <https://doi.org/10.1007/s00436-019-06529-x>.
- Current WL, Reese NC, Ernst JV, Bailey WS, Heyman MB, Weinstein WM. Human cryptosporidiosis in immunocompetent and immunodeficient persons. Studies of an outbreak and experimental transmission. *N Engl J Med* [Internet]. 1983 May 26 [citado em 12 jun. 2023];308(21):1252-7. Disponível em: <https://doi.org/10.1056/NEJM198305263082102>.
- Dărăbuș G, Lupu MA, Mederle N, Dărăbuș RG, Imre K, Mederle O, et al. Epidemiology of *Cryptosporidium* infection in Romania: a review. *Microorganisms* [Internet]. 2023 [citado em 20 set. 2023];11(7):1793. Disponível em: <https://doi.org/10.3390/microorganisms11071793>.
- Dillingham RA, Lima AA, Guerrant RL. Cryptosporidiosis: epidemiology and impact. *Microbes Infect* [Internet]. 2002 Aug [citado em 12 jun. 2023];4(10):1059-66. Disponível em: [https://doi.org/10.1016/s1286-4579\(02\)01630-1](https://doi.org/10.1016/s1286-4579(02)01630-1).
- European Centre for Disease Prevention and Control. Annual epidemiological report 2014: food and waterborne diseases and zoonoses [Internet]. Stockholm: ECDC; 2014 [citado em 25 ago. 2022]. 103 p. Disponível em: <https://www.ecdc.europa.eu/sites/default/files/media/ver/publications/Publications/food-waterborne-diseases-annual-epidemiological-report-2014.pdf>.
- Fayer R, Morgan U, Upton SJ. Epidemiology of *Cryptosporidium*: transmission, detection and identification. *Int J Parasitol* [Internet]. 2000 Nov [citado em 12 jun. 2023];30(12-13):1305-22. Disponível em: [https://doi.org/10.1016/s0020-7519\(00\)00135-1](https://doi.org/10.1016/s0020-7519(00)00135-1).
- Fayer R, Ungar BL. *Cryptosporidium* spp. and cryptosporidiosis. *Microbiol Rev* [Internet]. 1986 Dec [citado em 12 jun. 2023];50(4):458-83. Disponível em: <https://doi.org/10.1128/mr.50.4.458-483.1986>.
- Fujii KY, Dittrich R, Castro EA, Almeida JC. Ocorrência de *Cryptosporidium* spp. em dois centros de treinamento de equinos de Curitiba, Paraná. *Braz J Vet Res Anim Sci* [Internet]. 2014 [citado em 12 jun. 2023];51(2):118-21. Portuguese. Disponível em: <https://doi.org/10.11606/issn.1678-4456.v51i2p118-121>.

Galuppi R, Piva S, Castagnetti C, Iacono E, Tanel S, Pallaver F, et al. Epidemiological survey on *Cryptosporidium* in an Equine Perinatology Unit. *Vet Parasitol* [Internet]. 2015 May 30 [citado em 13 jun. 2023];210(1-2):10-8. Disponível em: <https://doi.org/10.1016/j.vetpar.2015.03.021>.

Gomes AD, Barretta C, Ziegler DP, Sausen L, Stoeber N, Sangioni LA, et al. Prevalência de *Cryptosporidium* spp e *Giardia* sp em eqüinos estabulados no Jockey Club de Santa Maria - RS, Brasil. *Cienc Rural* [Internet]. 2008 Dec [citado em 12 jun. 2023];38(9):2662-5. Portuguese. Disponível em: <https://doi.org/10.1590/S0103-84782008005000012>.

Grinberg A, Pomroy WE, Carslake HB, Shi Y., Gibson IR, Drayton BM. A study of neonatal cryptosporidiosis of foals in New Zealand. *N Z Vet J* [Internet]. 2009 Oct [citado em 12 jun. 2023];57(5):284-9. Disponível em: <https://doi.org/10.1080/00480169.2009.58622>.

Helmy YA, Hafez HM. Cryptosporidiosis: from prevention to treatment, a narrative review. *Microorganisms* [Internet]. 2022 Dec 13 [citado em 20 set. 2023];10(12):1793. Disponível em: <https://www.mdpi.com/2076-2607/10/12/2456>.

Inácio SV, Brito RL, Zucatto AS, Coelho WM, Aquino MC, Aguirre AA, et al. *Cryptosporidium* spp. infection in mares and foals of the northwest region of São Paulo State, Brazil. *Rev Bras Parasitol Vet* [Internet]. 2012 Oct-Dec [citado em 12 jun. 2023];21(4):355-8. Disponível em: <https://doi.org/10.1590/S1984-29612012005000003>.

Inácio SV, Widmer G, Lemos RL, Zucatto AS, Aquino MC, Oliveira BC, et al. First description of *Cryptosporidium hominis* GP60 genotype Ika2061 and *Cryptosporidium parvum* GP60 genotypes IlaA18G3R1 and IlaA1562R1 in foals in Brazil. *Vet Parasitol* [Internet]. 2017 Jan 15 [citado em 12 jun. 2023];233:48-51. Disponível em: <https://doi.org/10.1016/j.vetpar.2016.11.021>.

Karanis P, Kourenti C, Smith H. Waterborne transmission of protozoan parasites: a worldwide review of outbreaks and lessons learnt. *J Water Health* [Internet]. 2007 Mar [citado em 17 jul. 2023];5(1):1-38. Disponível em: <https://doi.org/10.2166/wh.2006.002>.

Khan A, Shams S, Khan S, Khan MI, Khan S, Ali A. Evaluation of prevalence and risk factors associated with *Cryptosporidium* infection in rural population of district Buner, Pakistan. *PLoS One* [Internet]. 2019 Jan 2 [citado em 20 set. 2023];14(1):e0209188. Disponível em: <https://doi.org/10.1371/journal.pone.0209188>.

Lam HY, Tseng YC, Wu WJ, Yu YH, Cheng PC, Peng SY. Prevalence and genotypes of *Cryptosporidium* in livestock in Hualien Country, Eastern Taiwan. *Parasitol Int* [Internet]. 2022 Jun [citado em 14 jun. 2023];88:102553. Disponível em: <https://doi.org/10.1016/j.parint.2022.102553>.

Learmonth JJ, Ionas G, Ebbett KA, Kwan ES. Genetic characterization and transmission cycles of *Cryptosporidium* species isolated from humans in New Zealand. *Appl Environ Microbiol* [Internet]. 2004 Jul [citado em 12 jun. 2023];70(7):3973-8. Disponível em: <https://doi.org/10.1128/AEM.70.7.3973-3978.2004>.

Mac Kenzie WR, Hoxie NJ, Proctor ME, Gradus MS, Blair KA, Peterson DE, et al. A massive outbreak in Milwaukee of cryptosporidium infection transmitted through the public

water supply. *N Engl J Med* [Internet]. 1994 Jul 21 [citado em 12 jun. 2023];331(3):161-7. Disponível em: <https://doi.org/10.1056/NEJM199407213310304>.

Majewska AC, Solarczyk P, Tamang L, Graczyk TK. Equine *Cryptosporidium parvum* infections in western Poland. *Parasitol Res* [Internet]. 2004 Jul [citado em 20 mar 2023];93(4):274-8. Disponível em: <https://doi.org/10.1007/s00436-004-1111-y>.

Majewska AC, Werner A, Sulima P, Luty T. Survey on equine cryptosporidiosis in Poland and the possibility of zoonotic transmission. *Ann Agric Environ Med* [Internet]. 1999 [citado em 15 jun. 2023];6(2):161-5. Disponível em: https://www.researchgate.net/publication/51354239_Survey_on_equine_cryptosporidiosis_in_Poland_and_the_possibility_of_zoonotic_transmission.

Marcial MA, Madara JL. *Cryptosporidium*: cellular localization, structural analysis of absorptive cell-parasite membrane-membrane interactions in guinea pigs, and suggestion of protozoan transport by M cells. *Gastroenterology* [Internet]. 1986 Mar [citado em 6 jun. 2022];90(3):583-94. Disponível em: [https://doi.org/10.1016/0016-5085\(86\)91112-1](https://doi.org/10.1016/0016-5085(86)91112-1).

Marques SM. Cryptosporidiosis in horses of urban areas of Porto Alegre, Rio Grande do Sul, Southern Brazil. *J Equine Vet Sci* [Internet]. 2010 Jul [citado em 26 jul. 2023];30(7):356-8. Disponível em: <https://doi.org/10.1016/j.jevs.2010.05.006>.

Mason RW, Hartley WJ, Tilt L. Intestinal cryptosporidiosis in a kid goat. *Aust Vet J* [Internet]. 1981 Aug [citado em 6 jun. 2022];57(8):386-8. Disponível em: <https://doi.org/10.1111/j.1751-0813.1981.tb00529.x>.

McKenzie DM, Diffay BC. Diarrhoea associated with cryptosporidial oocyst shedding in a Quarterhorse stallion. *Aust Vet J* [Internet]. 2000 Jan [citado em 13 jun. 2023];78(1):27-8. Disponível em: <https://doi.org/10.1111/j.1751-0813.2000.tb10351.x>.

Meisel JL, Perera DR, Meligro C, Rubin CE. Overwhelming watery diarrhea associated with a cryptosporidium in an immunosuppressed patient. *Gastroenterology* [Internet]. 1976 Jun [citado em 12 jun. 2023];70(6):1156-60. Disponível em: [https://doi.org/10.1016/S0016-5085\(76\)80331-9](https://doi.org/10.1016/S0016-5085(76)80331-9).

Morgan UM, Xiao L, Fayer R, Lal AA, Thompson RC. Variation in *Cryptosporidium*: towards a taxonomic revision of the genus. *Int J Parasitol* [Internet]. 1999 Nov [citado em 25 jan. 2022];29(11):1733-51. Disponível em: [https://doi.org/10.1016/s0020-7519\(99\)00109-5](https://doi.org/10.1016/s0020-7519(99)00109-5).

Netherwood T, Wood JL, Townsend HG, Mumford JA, Chanter N. Foal diarrhoea between 1991 and 1994 in the United Kingdom associated with *Clostridium perfringens*, rotavirus, *Strongyloides westeri* and *Cryptosporidium* spp. *Epidemiol Infect* [Internet]. 1996 Oct [citado em 13 jun. 2023];117(2):375-83. Disponível em: <https://doi.org/10.1017/s0950268800001564>.

Nime FA, Burek JD, Page DL, Holscher MA, Yardley JH. Acute enterocolitis in a human being infected with the protozoan *Cryptosporidium*. *Gastroenterology* [Internet]. 1976 Apr [citado em 12 jun. 2023];70(4):592-8. Disponível em: [https://doi.org/10.1016/S0016-5085\(76\)80503-3](https://doi.org/10.1016/S0016-5085(76)80503-3).

Overgaauw PA, Van Zutphen L, Hoek D, Yaya FO, Roelfsema J, Pinelli E, et al. Zoonotic parasites in fecal samples and fur from dogs and cats in The Netherlands. *Vet Parasitol* [Internet]. 2009 Jul 7 [citado em 6 jun. 2022];163(1-2):115-22. Disponível em: <https://doi.org/10.1016/j.vetpar.2009.03.044>.

Pancieria RJ, Thomassen RW, Garner FM. Cryptosporidial infection in a calf. *Vet Pathol* [Internet]. 1971 [citado em 7 jun. 2022];8(5-6):479-84. Disponível em: <https://doi.org/10.1177/0300985871008005-00610>.

Puleston RL, Mallaghan CM, Modha DE, Hunter PR, Nguyen-Van-Tam JS, Regan CM, et al. The first recorded outbreak of cryptosporidiosis due to *Cryptosporidium cuniculus* (formerly rabbit genotype), following a water quality incident. *J Water Health* [Internet]. 2014 Mar [citado em 25 ago. 2022];12(1):41-50. Disponível em: <https://doi.org/10.2166/wh.2013.097>.

Ribeiro DS, Martins AV, Lobão LF, Ribeiro MS, Palmer JP, Corrêa LL, et. al. Diagnosis, risk factors analysis and first molecular characterization of *Cryptosporidium* spp. in horses from Rio de Janeiro, Brazil. *Vet Parasitol Reg Stud Reports* [Internet]. 2022 Jan [citado em 5 maio 2022];27:100665. Disponível em: <https://doi.org/10.1016/j.vprsr.2021.100665>.

Ribeiro DS. Pesquisa de *Cryptosporidium* sp. em equinos mantidos em propriedades localizadas em Teresópolis, Rio de Janeiro, Brasil [dissertação]. Niterói: Instituto Biomédico, Universidade Federal Fluminense; 2021 [citado em 17 jul. 2023]. 93 p. Portuguese. Disponível em: <http://ppgmpa.sites.uff.br/wp-content/uploads/sites/160/2021/12/2021-Daniella-Sother-Carvalho-Ribeiro.pdf>.

Rossle NF, Latif B, Malik AS, Fadzli FM, Abu NA. Cryptosporidiosis among children with diarrhea admitted to Hospital Selayang and Hospital Sungai Buloh, Selangor, Malaysia. *J Trop Med Parasitol* [Internet]. 2012 Dec [citado em 12 jun. 2022];35(2):55-62. Disponível em: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=4ae32c12c0a9a8eea181fe332176e0883f5d0b18>.

Ryan EU, Hijjawi N, Xiao L. Foodborne cryptosporidiosis. *Int J Parasitol* [Internet]. 2018 Jan [citado em 20 set. 2023];48(1):1-12. Disponível em: <https://doi.org/10.1016/j.ijpara.2017.09.004>.

Santín M. Clinical and subclinical infections with *Cryptosporidium* in animals. *N Z Vet J* [Internet]. 2013 [citado em 2 jun. 2022];61(1):1-10. Disponível em: <https://doi.org/10.1080/00480169.2012.731681>.

Santín M. Giardiasis and cryptosporidiosis in ruminants. *Vet Clin North Am Food Anim Pract* [Internet]. 2020 Mar [citado em 20 set. 2023];36(1):223-38. Disponível em: <https://doi.org/10.1016/j.cvfa.2019.11.005>.

Santín M, Trout JM. Companion animals. In: Fayer R, Xiao L, editors. *Cryptosporidium and cryptosporidiosis* [Internet]. 2nd ed. Boca Raton: CRC Press; 2007. p. 437-50 [citado em 7 jun. 2022]. Disponível em: <https://doi.org/10.1201/9781420052275>.

Silva NR, Braccini GL, Chaplin EL, Araujo FA. Infecção mista de equinos por *Cryptosporidium parvum* e *C. muris* no Estado do Rio Grande do Sul, Brasil.

Arq Fac Vet UFRGS. 1996;24(1):81-4. Portuguese.

Slavin D. *Cryptosporidium meleagridis* (sp. nov.). J Comp Pathol [Internet]. 1955 Jul [citado em 20 mar 2023];65(3):262-6. Disponível em: [https://doi.org/10.1016/S0368-1742\(55\)80025-2](https://doi.org/10.1016/S0368-1742(55)80025-2).

Smith RP, Chalmers RM, Mueller-Doblies D, Clifton-Hadley FA, Elwin K, Watkins J, et al. Investigation of farms linked to human patients with cryptosporidiosis in England and Wales. Prev Vet Med [Internet]. 2010 Apr 1 [citado em 12 jun. 2023];94(1-2):9-17. Disponível em: <https://doi.org/10.1016/j.prevetmed.2009.12.005>.

Snyder SP, England JJ, McChesney AE. Cryptosporidiosis in immunodeficient Arabian foals. Vet Pathol [Internet]. 1978 Jan [citado em 14 jun. 2023];15(1):12-7. Disponível em: <https://doi.org/10.1177/030098587801500102>.

Souza PN, Bomfim TC, Huber F, Abboud LC, Gomes RS. Natural infection by *Cryptosporidium* sp., *Giardia* sp. and *Eimeria leuckarti* in three groups of equines with different handlings in Rio de Janeiro, Brazil. Vet Parasitol [Internet]. 2009 Mar [citado em 13 jun. 2023];160(3-4):327-33. Disponível em: <https://doi.org/10.1016/j.vetpar.2008.10.103>.

Sturdee AP, Bodley-Tickell AT, Archer A, Chalmers RM. Long-term study of *Cryptosporidium* prevalence on a lowland farm in the United Kingdom. Vet Parasitol [Internet]. 2003 Oct 8 [citado em 14 jun. 2023];116(2):97-113. Disponível em: [https://doi.org/10.1016/s0304-4017\(03\)00261-9](https://doi.org/10.1016/s0304-4017(03)00261-9).

Toscan G, Pereira RC, Vogel FS, Sangioni LA. *Cryptosporidium* spp. in traction horses in Santa Maria, RS, Brazil. Arq Bras Med Vet Zootec [Internet]. 2010 Feb [citado em 12 jun. 2023];62(1):211-3. Disponível em: <https://doi.org/10.1590/S0102-09352010000100029>.

Tyzzar E. A sporozoan found in the peptic glands of the common mouse. Exp Biol Med [Internet]. 1907 Oct [citado em 12 jun. 2023];5(1):12-3. Disponível em: <https://doi.org/10.3181/00379727-5-5>.

Wagnerová P, Sak B, McEvoy J, Rost M, Sherwood D, Holcomb K, et al. *Cryptosporidium parvum* and *Enterocytozoon bienersi* in American Mustangs and Chincoteague ponies. Exp Parasitol [Internet]. 2016 Mar [citado em 12 jun. 2023];162:24-7. Disponível em: <https://doi.org/10.1016/j.exppara.2015.12.004>.

Xiao L, Fayer R, Ryan U, Upton SJ. *Cryptosporidium* taxonomy: recent advances and implications for public health. Clin Microbiol Rev [Internet]. 2004 Jan [citado em 20 mar 2023];17(1):72-97. Disponível em: <https://doi.org/10.1128/CMR.17.1.72-97.2004>.

Xiao L, Herd RP. Review of equine *Cryptosporidium* infection. Equine Vet J [Internet]. 1994 Jan [citado em 12 jun. 2023];26(1):9-13. Disponível em: <https://doi.org/10.1111/j.2042-3306.1994.tb04322.x>.

Xiao L. Molecular epidemiology of cryptosporidiosis: an update. Exp Parasitol [Internet]. 2010 Jan [citado em 2 jun. 2022];124(1):80-9. Disponível em: <https://doi.org/10.1016/j.exppara.2009.03.018>.

Xiao L, Ryan UM. Molecular epidemiology. In: Fayer R, Xiao L, editors. *Cryptosporidium and cryptosporidiosis* [Internet]. 2nd ed. Boca Raton: CRC Press; 2007. p. 119-63 [citado em 27 maio 2022]. Disponível em: <https://doi.org/10.1201/9781420052275>.

APÊNDICE 1– FICHA DE AVALIAÇÃO DOS EQUINOS



FICHA DE AVALIAÇÃO DOS EQUINOS

Nome/Número:	Sexo	Idade	Data estimada da desvermifugação	Vermífugo (s)
Obs.: _____ _____ _____				

Alimentação: _____

Peso aprox.: _____

Estabulado: _____

Saídas a campo: _____

Baias separadas: () sim () não Piso coberto com: () concreto/serragem () concreto e outros materiais _____ Bebedouros nas baias: () sim () não Comedouros: () sim () não

Presos à parede: () sim () não Alvenaria () Outros materiais ()

Contato com cães ou outros animais: () sim () não Quais: _____

Fezes: () normais () pastosas () diarreicas

Tratamento com: () metronidazol ou () sulfa ~~trimetropim~~

* Qualquer informação relevante pode ser relatada no verso da folha *



ANEXO – NORMAS DE PUBLICAÇÃO DA REVISTA DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL

Instructions - Scope and policy

Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine is a multidisciplinary, open-access, and peer-reviewed journal publishing original research from all fields of tropical medicine (including epidemiology, clinical studies, pathology, and immunology) and infectious diseases. It is the official journal of the Brazilian Society of Tropical Medicine. The journal publishes Major Articles, Short Communications, Case Reports, Editorials, Letters to the Editor, Images in Infectious Diseases, Technical Reports, Obituaries, and Special Numbers (supplements). Review articles are invited by the Editor or Associate Editors. The journal publishes manuscripts only in English. Its content is freely accessible to readers, and no publication fee is charged from the authors.

From 2017, the journal has established that the authors will be requested to send the certificate of English review and editing by a professional English editing company during the manuscript submission process.

From January 2019, *Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine* has adopted the yearly continuous publication modality, which is available online on SciELO database.

Review policy

Submission to *Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine* implies that the manuscript has not been published previously (except in abstract format), and that it is not being considered for publication elsewhere.

Manuscripts submitted for publication in this journal are initially evaluated by the administrative staff to ensure compliance with the journal guidelines. The manuscripts that meet the basic requirements are then sent to reviewers for evaluation through a peer-review system. The journal editors will use detailed reports from the reviewers to decide whether to accept a submitted paper. In case of a difference of opinion among the reviewers, the manuscript will be sent to another reviewer to validate the final editorial decision, in accordance with the submission workflow of the journal (available online at <http://www.scielo.br/revistas/rsbmt/iinstruc.htm#006>).

Manuscripts must be written in English and submitted electronically using the following link: <http://mc04.manuscriptcentral.com/rsbmt-scielo>

Poor use of English language in manuscripts is the major cause of delay in publication. We strongly advise authors with English as a foreign language to have their manuscripts preferably translated and edited by a professional English translation and editing company, or checked by a scientist who is a native English speaker. A copy of the certificate should be sent to the journal.

The editorial office can be contacted at the following address:

Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine - e-mail: rsbmt@rsbmt.uftm.edu.br - Website: <http://www.scielo.br/rsbmt>

Fast-track submissions: According to the established editorial policy, manuscripts considered eligible for fast-track evaluation by the Journal's Editors will be peer-reviewed within one week and, if accepted, they will be published within four to eight weeks. Disease priority will be determined by the Editorial Board according to its epidemic occurrence in Brazil or worldwide.

Preprints: *Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine* supports the international initiatives that resulted in a more transparent editorial process, currently known as the "Open Science" tendency. Thus, manuscripts deposited in the preprint server (bioRxiv) could be submitted to *Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine*. The peer-review process for articles based on preprint servers will be decided by the Journal's Editorial Board. (<https://blog.scielo.org/en/2019/10/23/tropical-medicine-infectious-and-parasitic-diseases-journals-align-with-open-science-editorial-practices/#.XbMJH5JKiJA>).

Manuscript types

The journal invites the following types of manuscripts for consideration: Major Articles, Review and Mini-Review Articles, Editorials, Short Communications, Case Reports, Obituaries, Technical Reports, Images in Infectious Diseases, Letters to the Editor, and Special Numbers (Supplements).

Major Articles: Major Article manuscripts must report original research, not previously published or in consideration for publication elsewhere. Major articles have a limit of 3,500 words (excluding the abstract, title, references, and illustrations). Manuscripts must include a structured abstract of not more than 250 words, organized using the following headings: Introduction, Methods, Results, and Conclusions. The manuscript text should be organized into the following sections: title, running title, structured abstract, keywords (three to six), manuscript text (Introduction, Methods, Results, and Discussion), acknowledgments, conflict of interest statement, financial support, references, and figure legends. A total of five illustrations (tables and figures) are allowed.

Systematic Reviews and meta-analyses: We consider submissions with systematic reviews and meta-analyses as research articles. Authors may submit these manuscripts by selecting the "major articles" modality. Reports of systematic reviews and meta-analyses must adhere to the PRISMA (<http://www.prisma-statement.org>) Statement or other guidelines applicable to the study design.

Review Articles: Review articles should present a critical review of recent trends and progress in the study of infectious diseases/tropical medicine, rather than a simple literature review. Review articles are usually invited by the Editor or Associate Editors. Review articles have a limit of 3,500 words (excluding the abstract, title, references, and illustrations) and should be accompanied by a non-structured abstract of up to 250 words. Five illustrations (tables and figures) are allowed. The journal also publishes mini-reviews. These articles have a limit of 3,000 words (excluding the abstract, title, references, and illustrations) and must be accompanied by a non-structured abstract of up to 250 words. Mini-reviews may contain up to three illustrations (tables and figures). The manuscript should be organized into the following sections: title, running title, abstract (non-structured), manuscript text, acknowledgments, conflict of interest statement, financial support, references, and figure legends.

Editorials: Editorials are typically written on invitation, bearing in mind the scope of the journal and its editorial policy. Editorials have a limit of 1,500 words, and do not require an

abstract and keywords. They may use one illustration (table or figure), and should have a conflict of interest statement, and a list of 10 or fewer references.

Short Communications: Short communication manuscripts should be reports on exciting new results/techniques of research or investigation in areas within the scope of the journal. Such articles have a limit of 2,000 words (excluding the abstract, title, references, and illustrations). They should have a structured abstract of not more than 100 words (with the subheadings: Introduction, Methods, Results, and Conclusions) and may include up to 15 references. Up to three illustrations (tables and figures) are allowed. Three to six keywords are allowed. The body of the manuscript should not be divided into topics or subheadings. Acknowledgments, conflict of interest statement, and financial support must be included.

Case Reports: Case Reports must be brief reports with a limit of 1,500 words (excluding the abstract, title, references, and illustrations), with a maximum of three illustrations (tables and figures), up to 12 references, three keywords, and a non-structured abstract of up to 100 words. The body of the manuscript should be divided according to the following headings: Introduction, Case report, Discussion, References, and Figure legends. Acknowledgments, conflict of interest statement, and financial support must be included.

Technical Reports: Technical reports should be concise reports on the results and recommendations of a meeting of experts. Such reports may be also considered if they are formatted as an editorial.

Images in Infectious Diseases: An Images in Infectious Diseases submission must include up to three photographs/figures with the best possible quality. Up to three authors and three references are allowed. The maximum length of such an article is 250 words (excluding title and references), with an emphasis on figure description. The theme should involve the clinical lesson clarified by appropriate illustrations and figure descriptions.

Letters to the Editor: Readers are encouraged to write about any topic related to infectious diseases and tropical medicine that fits into the scope of the journal. Letters should be no longer than 1,200 words, without abstract and keywords, and with only one illustration (table or figure). Letters may discuss material previously published in the journal and cite up to 12 references.

Special Numbers: Proposals for special numbers (supplements) must be made in writing to the Editor and/or Guest Editor. They will be evaluated on the basis of suitability of the topic, program organization, scientific format or production, according to the scope of the journal.

Manuscript preparation

Authors are advised to read these instructions carefully and follow them closely to ensure the timely and efficient review and publication of their manuscript. The editors reserve the right to return manuscripts that do not comply with these guidelines.

Online submission system: All manuscripts to be considered for publication in the journal should be submitted in electronic form via the online submission system at <http://mc04.manuscriptcentral.com/rsbmt-scielo>. The author must choose one manuscript category from the “Manuscript types” menu: Major Article, Editorial, Review Article, Mini-Review, Short Communication, Case Report, Technical Report, Images in Infectious Diseases, Letter to the Editor, Authors’ Reply, or Other (when a submission does not fit any other category). Authors and co-authors are entirely responsible for the contents of the manuscript.

Cover Letter: a) It must contain a statement that the proposed manuscript describes original research and is not published or under consideration for publication by another scientific journal. The cover letter must also state that the data/results of the manuscript are not plagiarized. b) The letter must be signed by all authors and, when strictly impossible, the first and the last author may sign by proxy for the other co-authors. c) The authors must include a declaration of their agreement that the manuscript, after submission, may not have the order or the number of authors altered without providing any justification and/or information to Revista da Sociedade Brasileira de Medicina Tropical or Journal of the Brazilian Society of Tropical Medicine. d) The authors must declare that if the manuscript is accepted for publication, they agree to the transfer of all copyrights to the journal.

Authors must state the server, period, and DOI code in the Cover Letter when uploading a manuscript to the preprint server.

Authors' contribution: The authors must provide one or more contributions each, specifying the contribution of each author to the study, in a separate document, in the submission system. The authors' contributions will be published at the end of the manuscript.

Supplemental material: it is defined as files related to a specific manuscript, which authors supply for publication linked to their manuscripts. Generally, they are additional pieces to the article that could not be included in the issue, such as appendices, spreadsheets, tables, figures that is impossible to present within the article. All supplementary material will be sent to reviewers for peer review. The Editor-in-Chief, Associated, and Section Editors will define the about limits for received supplementary material.

We strongly recommend that Supplementary Material uploaded into the system be in the following format:

- Preferable be uploaded in PDF format or provide link to access files;
- Supplementary tables and figures with five or more pieces please provide a PDF file.

Providing small size files for quick download purposes.

Manuscript Template

The manuscript should be prepared using a word processing software, and saved as a .doc or .docx file. Preferred font is Times New Roman, size 12, with double spacing throughout the text, figure legends, and references, with margins of at least 3 cm. Organize the manuscript into the following sections: Cover Letter (addressed to the Editor-in-Chief), Title Page, including Manuscript Title, Running title, Abstract, Keywords, followed by Manuscript Text, Conflict of Interest statement, Acknowledgments, Financial Support, References, and Figure Legends. Cover Letter, Title Page, Acknowledgments, and Financial Support must be provided as separate documents. Abbreviations should be used sparingly.

Title Page: The title page should include the authors' names in direct order and without abbreviations, along with institutional affiliations in the following sequence: author's institution, department, city, state, and country. For Brazilian authors, please do not translate the names of institutions. Complete address of the corresponding author must be specified, including telephone number and e-mail address. The number of authors and co-authors per paper should be limited in accordance with the number of authors that contributed to the manuscript. Except for national and international multicenter studies, up to 20 authors and co-authors will be allowed. The remaining authors' names will be published in a footnote. Provide the ORCID number of the corresponding author and all co-authors.

Potential reviewers: Authors must provide names and contact information (e-mail address and institutional affiliations) of three potential unbiased reviewers, from an institution different from that of the authors.

Title: The title should be as concise, clear, and informative as possible. It should not contain abbreviations and should not exceed 250 characters.

Running Title: The running title may include up to 100 characters.

Structured Abstract: The structured abstract should summarize the results obtained and the major conclusions in such a way that a reader not already familiar with the particular topic of the paper can understand the implications of the article. The abstract should not exceed 250 words and must be structured with the following headings: Introduction, Methods, Results, and Conclusions. The use of abbreviations should be avoided.

Keywords: Three to six keywords should be listed immediately below the structured abstract (Example: Tuberculosis. Primary health care. Structure of services.). Please visit the website <https://www.ncbi.nlm.nih.gov/mesh> for reference.

Introduction: The article's introduction should be brief, and stating the purposes for which the study has been performed. Previous studies should be cited only when essential.

Methods: The methods used in the study should be clear and sufficiently detailed, so that the readers and reviewers can understand precisely what has been done and allow replication of the study by others. Standard techniques only need to be referenced.

Ethics: If the work involves human subjects, the author should indicate that the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional, regional, or national) and in accordance with the principles of Declaration of Helsinki, 1964, as revised in 1975, 1983, 1989, 1996, and 2000. For animal experiments, the author should indicate whether a national research council's guide for animal experimentation or any law on the care and use of laboratory animals was complied with. The approval number must be sent to the journal. In case of research on humans, authors must include in the methods section (ethical considerations subsection), a statement that the study was approved by the Institutional Ethics Committee.

Clinical trials: In the case of clinical trials, the manuscript should be accompanied by the registration number and agency of registration of the clinical trial (REBEC platform).

Results: The results section should be a concise and impersonal account of the new information (all relevant positive and negative findings) revealed by the study. Avoid repeating in the text the data presented in the tables or illustrations and use past tense to write the results.

Discussion: The discussion section should be limited to the significance of the new information and tightly argued, considering the clinical relevance, strengths, and study limitations. Do not include a general review of the topic. Keep the discussion concise and relevant. The main conclusions should be presented as the last paragraph of the discussion section.

Acknowledgments: Any acknowledgments should be short, concise, and restricted to those that are necessary and do not meet the authorship criteria. In case of sponsoring institutions, do not use acronyms.

Conflict of Interest: All authors are required to disclose any type of conflict of interest during the development of the study.

Financial Support: List all the financial support received from agencies, institutions, and other organizations that funded a part or whole of the research.

References: Only references cited in the text should be included in the list at the end of the manuscript. The references should be numbered consecutively in progressive order using Arabic numerals as they appear in the text. The reference list should be formatted according to the Vancouver style. All authors, up to six, must be listed. For seven or more authors, list the first six, followed by “et al.” Type the reference list on a separate page at the end of the manuscript, using double spacing.

Numbered references to personal communications, unpublished data, or manuscripts either “in preparation” or “submitted for publication” should not be listed among the references. Papers accepted for publication should be referred to as “in press” and the letter of acceptance of the journal must be provided. Such material can be incorporated at the appropriate place in the text in accordance with the following examples: (AB Figueiredo: Personal Communication, 1980), (CD Dias, EF Oliveira: Unpublished Data). In-text citations should be indicated using the appropriate reference numbers as superscripts to the corresponding word, separated by comma or hyphen, example, World^{1,2}, Life^{30,42,44-50}. The references at the end of the manuscript should follow the system used in ‘the uniform requirements for manuscripts submitted to biomedical journals’ (for more information, please visit <http://www.nlm.nih.gov/citingmedicine>). The titles of journals referenced should be abbreviated according to the style used in the Index Medicus (for more information, please visit <https://www.ncbi.nlm.nih.gov/nlmcatalog/journals>).

Responsibility for the bibliographic citations in the text and reference list lies entirely with the authors. Following are the sample references:

1. Articles from journals: Last names and initials of the six cited authors (For seven or more authors, list the first six, followed by “et al.”), full title of the article (in original language), abbreviated title of the journal (can be found at: <https://www.ncbi.nlm.nih.gov/nlmcatalog/journals>), year of publication, volume number, the first and the last page numbers.

Example 1: Petitti DB, Crooks VC, Buckwalter JG, Chiu V. Blood pressure levels before dementia. *Arch Neurol*. 2005;62(1):112-6.

Example 2: Freitas EC, Oliveira MF, Vasconcelos ASOB, Filho JDS, Viana CEM, Gomes KCMS, et al. Analysis of the seroprevalence of and factors associated with Chagas disease in an endemic area in northeastern Brazil. *Rev Soc Bras Med Trop*. 2016;50(1):44–51.

2. Book chapter: Cite last names and initials of all Authors of the chapter, Chapters’ full title, Editors, Title of book, edition, Place of Publication: Publisher, Year of publication, chapter pages.

Example: Blaxter PS, Farnsworth TP. Social health and class inequalities. In: Carter C, Peel JR, editors. *Equalities and inequalities in health*. 2nd ed. London: Academic Press; 1976. p. 165–78.

3. Book: Last names and initials of the authors, Title of book, edition, Place of Publication: Publisher, Year of publication, Pagination.

Example: Carlson BM. *Human embryology and developmental biology*. 4th ed. St. Louis: Mosby; 2009. 541 p.

4. Websites: Author/organization’s name. Title of the page [Internet]. Place of publication: Publisher’s name; Date or year of publication [updated yr month day; cited yr month day]. Available from: URL

Example: Diabetes Australia. Diabetes globally [Internet]. Canberra ACT: Diabetes Australia; 2012 [updated 2012 June 15; cited 2012 Nov 5]. Available from: <http://www.diabetesaustralia.com.au/en/Understanding-Diabetes/DiabetesGlobally/>

5. Dissertation/PhD Theses: Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine will not accept the citation of dissertations for a Master of Science, PhD theses, or similar material.

6. World Health Organization (WHO). Chemotherapy of leprosy for control programmes. Technical Report Series 675. Geneva: WHO; 1982. 36 p.

7. Ministério da Saúde (MS). Secretaria de Vigilância em Saúde. Sistema Nacional de Vigilância em Saúde – Relatório de Situação: Mato Grosso do Sul. 5ª edição. Brasília: MS; 2011. 39 p.

Illustrations: All illustrations should be submitted as separate files, and named using only the figure number (e.g., figure 1, figure 2). All figures should be numbered using Arabic numerals and cited consecutively in the text. Authors can upload colored, or black and white figures.

Titles and Legends: Titles and legends should be typed at the end of the manuscript with double spacing.

Dimensions: The dimensions of the illustrations and figures should not exceed 18 cm width by 23 cm height. The correct specifications for each figure format are as follows:

- Images/Photographs must be submitted in high-resolution TIFF format. Verify that the photograph must have been taken at a minimum resolution of 600 dpi—preferably between 900 and 1200 dpi—and prepared using an image editing program (e.g., Adobe Photoshop, Corel Photo Paint).

- Graphics should be created using any statistical software and saved/exported using the original extensions (.xls, .xlsx, .wmf, .eps., or .pdf).

- Maps should be professionally vectorized (drawn) in high resolution using CorelDraw or Adobe Illustrator software.

Tables: Tables should be typed with single spacing, with a short descriptive title (positioned above the table), and submitted as separate files. Legends for each table should be placed below the table. All tables should be numbered using Arabic numerals and cited consecutively in the text. Tables should not have vertical lines, whereas, horizontal lines should be kept to a minimum. Tables should be a maximum of 18 cm wide by 23 cm high, using Arial, size 9 font.

Submission Process: All manuscripts should be submitted online at <http://mc04.manuscriptcentral.com/rsbmt-scielo> in accordance with the instructions at the top of each screen. The peer review process is performed completely online.

On Resubmissions and Revisions: The journal differentiates between: a) manuscripts that have been rejected, and b) manuscripts that will undergo further consideration after requested changes have been made.

Resubmissions: If you have received a letter of rejection and wish the editors to reconsider their decision, you may resubmit your manuscript. In this case, your file will be considered a new submission and you will receive a new manuscript number.

Revision: If the peer reviewers recommend revising your manuscript, please send it for a second analysis and review, forwarding the revised manuscript with the same manuscript number as the original.

After Acceptance: Once a manuscript is accepted for publication, the publication process includes the following steps:

a) A copyright assignment form, provided by the journal's secretary and signed by the authors, must be returned to the journal.

b) Proofs will be sent to the corresponding author to be carefully checked for typesetting accuracy. Changes or additions to the edited manuscript cannot be allowed at this stage of the editing process. The corrected proofs should be returned to the journal as soon as possible after their receipt by the corresponding author.

c) Erratum requirements will only be accepted in case of confirmation of the fault on part of the technical staff of Journal of the Brazilian Society of Tropical Medicine.

d) Accepted articles will be available in a continuous publication modality online on SciELO database.

Page Charges: There will be no page charges for publication in this journal.

Revista da Sociedade Brasileira de Medicina Tropical/Journal of the Brazilian Society of Tropical Medicine does not provide any kind of translation service.

Workflow

SUBMISSION WORKFLOW OF *REVISTA DA SOCIEDADE BRASILEIRA DE MEDICINA TROPICAL*/JOURNAL OF THE BRAZILIAN SOCIETY OF TROPICAL MEDICINE

All manuscripts to be considered for publication in *Revista da Sociedade Brasileira de Medicina Tropical*/Journal of the Brazilian Society of Tropical Medicine should be submitted in electronic form via the online submission system (<http://mc04.manuscriptcentral.com/rsbmt-scielo>).

Journal's review policy (workflow):

1 – All manuscripts submitted for publication in the journal are initially evaluated by the journal's administrative staff to ensure that the text complies with the journal's rules.

2 – Manuscripts that meet the standards of the journal are evaluated by the Editor, Associate Editors, or Section Editors to determine whether they fit into the scope and editorial policy of the journal. Subsequently, the administrative staff sends these manuscripts to the Editor-in-Chief.

3 – The Editor-in-Chief (or Associate/Section Editors) assigns the manuscript to the reviewers.

4 – Each submitted manuscript is sent to at least two reviewers in a double-blinded manner, and a statistical reviewer for evaluation and generation of a reasoned report (peer-review system), which is used by the editors to decide whether to accept the manuscript or not. In case of difference of opinion among the reviewers, the manuscript is sent to a third reviewer to help reach a final decision by the journal's editorial board.

5 – Reviewer comments (free form review) are forwarded to the corresponding author to address the queries raised by the reviewers.

6 – The authors must respond to the queries, point by point, of each reviewer, highlighted with a different color in the text and return a revised version of the manuscript in accordance with the journal's guidelines. The revised version is sent back to the reviewers, who provide a final and reasoned report on the manuscript.

- 7 – Reviewers' scores of the manuscript and the authors' responses are analyzed by the Editor, Associate Editors, or Section Editors.
- 8 – The Editor-in-Chief makes the final decision regarding acceptance or rejection of the manuscript for publication.
- 9 – The final editorial decision is sent to the authors.
- 10 – After this step, the editing process is initiated. The accepted manuscripts are sent for English editing and proper review.
- 11 – The English review results and edited document are sent to the authors for analysis. The authors must state whether they accept the edited version.
- 12 – Next, the layout process begins. The journal will communicate closely with the corresponding author regarding figures, tables, photographs, maps, illustrations, and the article's general format.
- 13 – Authors must disclose any conflicts of interest or financial support and must provide a signed copyright assignment form.
- 14 – Proofs are sent to the corresponding author to be checked, along with all co-authors for typesetting accuracy.
- 15 – The final version of each manuscript will be available in 100% open access at http://www.scielo.br/scielo.php?script=sci_issues&pid=0037-8682&lng=en&nrm=iso