

Research Note

Coprological assessment of gastrointestinal helminths in Arabian Thoroughbred horses housed in a stable in the Constantine region, Algeria

N. ZEGHILET^{1,*}, L. BOULTIF², S. DJEMAI², B. BOUCHOUCHA¹

¹Laboratoire de Gestion de la Santé et Productions Animales (GSPA Laboratory), Institute of Veterinary Sciences, University of Constantine 1, Algeria, E-mail: *noureddine.zeghilet@umc.edu.dz, brahim.bouchoucha@umc.edu.dz;

²Laboratoire de Recherche de Pathologie Animale, Développement des Élevages et Surveillance de la Chaîne Alimentaire des Denrées Animales ou d'origine Animale (PADESCA Laboratory), Institute of Veterinary Sciences, University of Constantine 1, Algeria, E-mail: boultilf.latifa@umc.edu.dz, samir.djemai@umc.edu.dz

Article info

Received April 16, 2026

Accepted June 9, 2026

Summary

This study assesses the gastrointestinal parasitological status of Arabian Thoroughbred horses at the Eastern Equestrian Club in Constantine (Algeria). In this semi-arid region, epidemiological data on equine parasitoses are lacking. Twenty fecal samples were analyzed using qualitative (flotation) and quantitative (McMaster) methods, complemented by morphological identification of parasitic eggs. The results reveal an overall prevalence of 50 %, with species diversity dominated by strongyles (60 % of positive cases), followed by *Strongyloides westeri* (40 %), *Habronema* spp. (30 %), *Eimeria leuckarti* (20 %), and *Parascaris* spp. (10 %). The excretion intensity, assessed through eggs per gram of feces (EPG), was predominantly low (<200 EPG for 80 % of samples), although two horses exhibited light burdens (200 – 380 EPG). The detection of *E. leuckarti*, a protozoan that can be pathogenic to foals, and the persistence of strongyles despite prophylactic measures highlight the challenges of parasite management in this breeding system. These findings suggest overall control of infestations, likely due to existing sanitary protocols, but also reveal residual risks related to parasite diversity and the potential emergence of anthelmintic resistance.

Keywords: Equine parasites; Strongyles; EPG; Constantine; Arabian Thoroughbred

Introduction

Gastrointestinal parasitic infections represent a major issue for equine health, affecting their welfare, productivity, and performance. These parasitoses are mainly caused by nematodes, cestodes, and protozoa, each capable of inducing a wide range of pathologies, from mild digestive disorders to severe conditions such as colic, gastric ulcerations, and even death (Alegre & Milano, 2020; Sazmand *et al.*, 2020; Efremova *et al.*, 2022; Attia & Omar, 2025).

Strongyles (including large strongyles such as *Strongylus vulgaris* and small strongyles, particularly cyathostomins) are the most

concerning gastrointestinal parasites in equids due to their high prevalence and significant pathogenic potential. They are often responsible for the majority of digestive disorders and deterioration in body condition (Sotiraki *et al.*, 1997; Tavassoli *et al.*, 2010; Gehlen *et al.*, 2020). Cestodes and certain protozoa may also cause intestinal lesions or severe diarrhea, particularly in young animals (Alegre & Milano, 2020; Sazmand *et al.*, 2020; Efremova *et al.*, 2022). The prevalence of these parasites varies by region, management practices, and animal age, but high infestation rates are frequently reported, highlighting the importance of regular monitoring and tailored prevention strategies (Efremova *et al.*, 2022; Golshang *et al.*, 2024). Furthermore, increasing anthelmintic re-

* – corresponding author

sistance and insufficient consideration of parasitoses in diagnostic protocols complicate management, making close surveillance essential to preserve equine health (Alegre & Milano, 2020; Sazmand *et al.*, 2020; Golshang *et al.*, 2024).

In Algeria, horses play a significant cultural and economic role. However, epidemiological data on equine parasitic infections remain scarce, particularly in the semi-arid region of Constantine. This lack of knowledge obscures the regional prevalence of parasites and suggests that even horses kept under rigorous breeding protocols, such as those at the Eastern Equestrian Club, can harbor large and diverse parasite populations. To address this gap, the present study aimed to characterize the parasitological status of these horses by combining qualitative (fecal flotation) and quantitative (fecal egg counting using the McMaster method) techniques.

Material and Methods

Sample collection and preparation

Twenty fresh fecal samples were collected from clinically healthy Arabian and Thoroughbred horses (*Equus caballus*) aged 3 – 15 years (juveniles 3 – 5 yr, n=6; adults 6 – 10 yr, n=9; seniors >10 yr, n=5; 12 males and 8 females) at the Eastern Equestrian Club, Constantine, Algeria (36°21'N, 6°36'E). Sampling occurred between October 2023 and April 2024. This extended period was designed to cover contrasting autumn–winter seasons and capture seasonal variation in egg shedding; it also reflected logistical constraints related to animal availability and the application of strict sample-quality criteria that led to the exclusion of several specimens.

Samples were retrieved immediately following natural defecation using disposable gloves to prevent cross-contamination. Approximately 50 – 100 g of feces was collected from the interior of each bolus to minimize environmental contamination, transferred into sterile, labeled polyethylene bags, and refrigerated at 4°C. All samples were transported to the Laboratory of Parasitology at the Institute of Veterinary Sciences, University of Constantine 1, within 4 h of collection and processed within 24 h to preserve egg morphology and viability. Prior to laboratory processing, each sample underwent macroscopic examination under standard lighting to identify grossly visible parasites, including adult stages, cestodes, proglottids, or larvae. Samples exhibiting excessive desiccation, substantial bedding contamination, or abnormal physical consistency were excluded from subsequent analyses. All horses were enrolled in a routine prophylactic anthelmintic program (ivermectin or benzimidazoles); the last treatment had been administered at least 8 – 12 weeks prior to sampling.

Parasitological analysis

The study combined two complementary analytical approaches for a comprehensive assessment of parasitic status. The flotation method, a widely used qualitative coproscopic technique (Thien-

pont *et al.*, 2003), is based on the principle of concentrating parasitic elements by density separation. Feces are mixed with a dense solution (density > 1.2), allowing, under centrifugation, the sedimentation of debris at the bottom of the tube while parasitic elements migrate to the surface. The standardized protocol consists of homogenizing 5 g of feces in tap water, followed by filtration through a sieve (250 µm). After centrifugation of the filtrate (2000 ×g, 5 min), the supernatant is discarded, and the pellet is resuspended in a saturated NaCl solution (40 g/100 mL, density = 1.2). A second centrifugation is performed under the same conditions, followed by adding solution until a convex meniscus forms, and the sample is then covered with a coverslip to trap parasitic elements. After 5 minutes of rest, the coverslip is removed and examined under a microscope (100 – 400×) to identify parasites. This method, reproducible and sensitive, is particularly suitable for diagnosing light infestations.

For precise quantification of parasite excretion, the modified McMaster technique was used as described by Taylor *et al.* (2016). It involves diluting 3 g of feces in 42 mL of distilled water, then homogenizing and filtering through double gauze (0.15 mm). The filtrate is centrifuged (1500 ×g, 5 min), and the pellet is resuspended in a saturated solution (density = 1.2) to obtain the initial volume. An aliquot is loaded into the chambers of a McMaster counting slide (0.15 mL/chamber), and oocysts are counted after 5 minutes of sedimentation under a microscope (100× magnification). The number of oocysts per gram of feces (EPG) is calculated using the formula:

$$\text{EPG} = (N \times 45) / (0.3 \times 3) = 50 \times N,$$

where N represents the total number of oocysts counted in both chambers, 45 mL is the total suspension volume, 0.3 mL is the combined chamber volume, and 3 g is the weight of feces analyzed.

Morphological identification

Identification of parasitic eggs was based on the analysis of their distinctive morphological characteristics, including size, shape, color, and the possible presence of specific structures such as a micropyle. Examination was performed using a light microscope equipped with a calibrated micrometer, consisting of two essential components (Thienpont *et al.*, 2003): an objective micrometer (a slide graduated in 10 µm divisions) and an ocular micrometer (an eyepiece with a graduated scale that varies by model).

Precise measurement of parasitic structures was performed using the formula:

$$\text{Length (}\mu\text{m)} = \text{Number of ocular divisions} \times \text{Magnification index},$$

where the index depends on the objective used (10× objective: 9.8 µm/division; 40× objective: 2.7 µm/division; 100× objective: 1 µm/division).

Data analysis and interpretation

Quantitative results were interpreted according to the classification system established by Euzéby (1981) and Ambrosi (1995), which

defines five levels of infestation based on EPG values. This rigorous methodological approach, combining validated qualitative and quantitative techniques, enabled a comprehensive and reliable evaluation of the parasitic status of the studied horses.

For statistical analysis, data were processed using R software (v4.2.1). After checking normality (Shapiro-Wilk test), comparisons were performed using Student's t-test (normal data) or Mann-Whitney test (non-parametric data). For multiple comparisons, a one-way ANOVA followed by Tukey's post-hoc test was applied. Correlations were assessed using Pearson's test (significance threshold $p < 0.05$). Parasitic prevalence was calculated as $[\text{Prevalence} = (\text{positive samples}/\text{total}) \times 100]$, with 95 % confidence intervals. Differences in prevalence were tested using Chi-square or Fisher's exact test (for small sample sizes).

Ethical Approval and/or Informed Consent

All experimental procedures involving animals were reviewed and approved by the Institutional Animal Ethics Committee of the University of Constantine 1. Animal husbandry and experimental conditions complied with relevant national regulations and institutional policies for the care and use of animals, in accordance with current equid welfare guidelines (Waran, 2007; Department for Environment, Food and Rural Affairs, 2017; Olczak & Tomczyk-Wrona, 2022; Waran & Evans, 2024).

Results

Analysis of the prevalence of parasitic entities

Macroscopic examination of fecal samples did not detect visible parasitic elements (larvae or adults). However, microscopic analysis revealed an overall prevalence of parasitic infestation of 50 %,

with 10 of 20 samples containing parasitic eggs or oocysts. This moderate prevalence suggests good effectiveness of the sanitary program implemented in the studied stable, while also indicating the persistence of certain infestations despite prophylactic measures.

The distribution of identified parasites (Fig. 1) shows a clear predominance of strongyles, detected in 60 % of positive cases (6/10). Other observed parasites included *Strongyloides westeri* (40 %, 4/10) and *Habronema* spp. (30 %, 3/10), *Eimeria leuckarti* (20 %, 2/10), and *Parascaris* spp. (10 %, 1/10). This parasitic diversity, although dominated by nematodes, highlights the need for a broad diagnostic approach including protozoa.

Morphological analysis of the parasite

Detailed morphological analysis of parasitic elements, illustrated in Figure 2, showing typical strongyle eggs (112.7 μm), enabled precise identification of different taxa. Systematic micrometric measurements, conducted according to the protocol of Thienpont *et al.* (2003), were a key factor in differentiating parasitic species.

Quantitative assessment

Quantitative analysis of eggs per gram of feces (EPG) across the 10 samples revealed a heterogeneous distribution of parasitic load (Fig. 3). Values ranged from 30 to 380 EPG, with infestation intensity predominantly low according to Ambrosi's classification (1995): 80 % of samples ($n=8$) were below 200 EPG, with individual values ranging from 30 to 104 EPG. Two subjects (20 %) exhibited light loads (200 – 380 EPG; samples 9 and 10), suggesting notable individual variation.

This distribution with a concentration of low values among 80 % of samples (30 to 104 EPG) and two markedly higher cases (200 and 380 EPG), may reflect differences in parasite exposure among

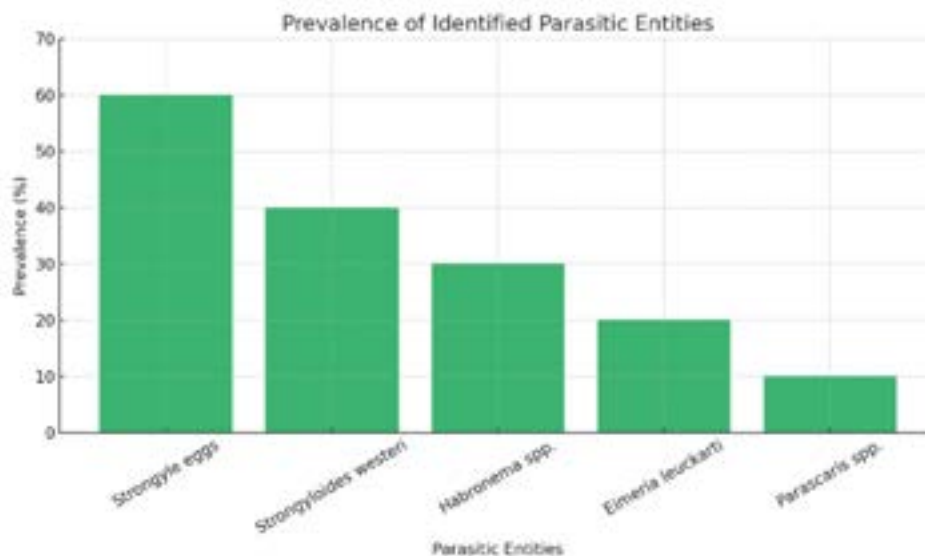


Fig. 1. Prevalence of parasitic entities identified in fecal samples.



Fig. 2. Strongyle eggs. Magnification $\times 10$; $11.5 \text{ divisions} \times 9.8 \mu\text{m}$ (magnification index) = $112.7 \mu\text{m}$.

individuals, variability in immune response, or differential effectiveness of control measures. Although infestation remained generally low (median = 82.5 EPG), the presence of dispersed values (30 – 104 EPG; 200 – 380 EPG) highlights the importance of an individual-based approach in assessing parasitic status. The two elevated values (200 and 380 EPG) although limited to minority of samples, warrant further investigation to rule out specific risk factors.

Discussion

Strongyle eggs were the most frequently detected parasites in this study, accounting for 60 % of positive fecal samples. This finding is consistent with numerous epidemiological data identifying strongyles as the primary gastrointestinal nematodes in equines, even in well-managed populations (Hinney *et al.*, 2011; Rehbein *et al.*, 2013; Jürgenschellert *et al.*, 2022; Molento *et al.*, 2024). Prevalence rates consistently exceeding 50 % in various geographical settings (Rehbein *et al.*, 2013; Negash *et al.*, 2021; Mulaw Berihun *et al.*, 2024) highlight the remarkable environmental resilience of their free-living life stages and their ability to persist despite routine anthelmintic treatments.

Age and sex are recognized host factors modulating parasite susceptibility. In this cohort, juveniles (3 – 5 yr) tended to show higher shedding of age-associated parasites (*S. westeri*, *Parascaris* spp.), consistent with the literature (Relf *et al.*, 2013; Boelow *et al.*, 2023). No significant sex-related difference was detected, likely

owing to the limited sample size.

Moreover, *Strongyloides westeri* was detected in 40 % of cases, an unusually high frequency compared with the typically reported range of 0.5 % to 8 % (Lyons & Tolliver, 2004; Relf *et al.*, 2013; Elghryani *et al.*, 2023). This particularity may be explained by the presence of young animals or environmental conditions favorable to its development. Similarly, *Habronema* spp., observed in 30 % of cases, exhibit a variable geographical distribution, with higher prevalence in environments conducive to vector-borne transmission, such as those involving flies.

The presence of *Eimeria leuckarti* in 20 % of horses, although based on a limited sample size, is a notable finding that warrants special attention. This protozoan is the only species of the genus *Eimeria* recognized as pathogenic in equids, with a more pronounced clinical impact in young animals, particularly foals. These may develop severe diarrhea and enteritis in some cases, although most infections remain asymptomatic or of limited clinical significance (Dubey & Bauer, 2018; Güleğen *et al.*, 2016; Rehman *et al.*, 2021). Its prevalence varies depending on region and management conditions, with higher rates observed in foals and in humid or poorly hygienic environments (Güleğen *et al.*, 2016; Rehman *et al.*, 2021). Although most studies report low oocyst excretion and absence of clinical signs in adults, pathogenic cases do occur, highlighting the need for increased vigilance, particularly in breeding systems housing young horses (Dubey & Bauer, 2018; Gorji *et al.*, 2023).

These observations justify adopting an expanded diagnostic ap-

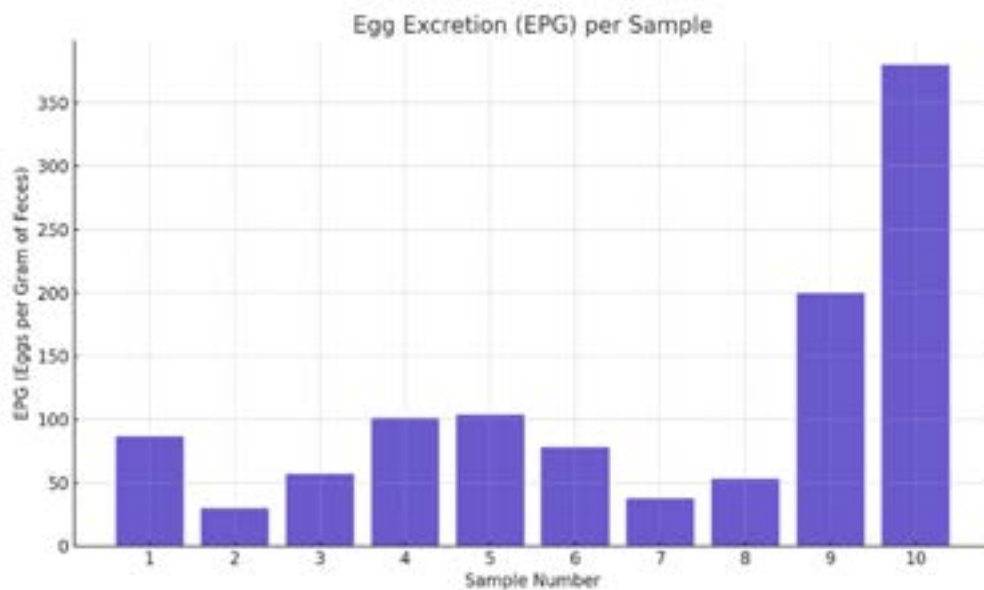


Fig. 3. Distribution of parasitic excretion values (eggs per gram of feces - EPG) in analyzed samples.

proach that includes not only helminths but also protozoa such as *E. leuckarti* to better prevent and manage digestive disorders in equids (De Souza *et al.*, 2009; Dubey & Bauer, 2018; Rehman *et al.*, 2021). Optimization of management practices, particularly regarding hygiene, feeding, and watering, could help reduce the prevalence of this parasite (Rehman *et al.*, 2021).

Parascaris spp., detected in 10 % of cases, completes this parasitological profile. This parasite is more common in foals, with prevalence ranging between 4 % and 22 % depending on the study (Lyons & Tolliver, 2004; Boelow *et al.*, 2023; Elghryani *et al.*, 2023; Molento *et al.*, 2024). The diversity of identified parasitic species, combined with the frequency of co-infections, complicates health management, as each species presents distinct biological cycles and pathogenic impacts (Rehbein *et al.*, 2013; Jürgenschellert *et al.*, 2022). Therefore, an integrated strategy combining targeted deworming, improved hygiene, and appropriate management of feeding and watering is essential for effective control (Elghryani *et al.*, 2023; Molento *et al.*, 2024).

The intensity of infestation was evaluated according to the scale proposed by Ambrosi (1995) and Euzéby (1981), which classifies infestations into different categories: less than 200 eggs per gram (EPG) corresponds to low infestation, 200 – 500 EPG to light infestation, 500 – 600 EPG to moderate infestation, 600 – 1000 EPG to high infestation, and above 1000 EPG to severe infestation. This quantitative approach, increasingly used in parasitology, allows better assessment of infestation severity and more precise adaptation of control measures (Kaplan & Nielsen, 2010; Nielsen, 2012). According to this classification, most infested horses (8 out of 10) exhibited low infestation, while two individuals (samples 9 and 10) showed light infestation (200 and 380 EPG, respectively). This distribution, characterized by a predominance of low-intensity

cases, is consistent with the well-documented aggregated pattern of strongyle egg shedding in equine populations, where the majority of horses act as low shedders (Relf *et al.*, 2013; Nielsen *et al.*, 2014). These results suggest relatively effective parasite control in the studied stable. Low to light excretion levels reflect well-managed antiparasitic practices, including regular diagnostic testing such as coproscopy and adaptation of treatments based on results. These practices are recommended to limit excessive anthelmintic use and prevent the development of resistance (Stratford *et al.*, 2014; Rendle *et al.*, 2024; Beasley *et al.*, 2025).

However, the persistence of multiple parasitic species indicates that the risk of reinfestation is not fully controlled. This situation may be explained by the resilience of parasite life cycles in the environment, in which eggs and larvae can persist for long periods in pastures, making complete eradication difficult even with rigorous management (Shrubb *et al.*, 2025; Raza *et al.*, 2019). It may also be attributed to the emergence of anthelmintic resistance, particularly in strongyles and *Parascaris* spp. Intensive and repeated use of the same drug classes has indeed promoted resistance development (Martin *et al.*, 2024; Nielsen *et al.*, 2014). Recent studies confirm resistance to several molecules, including fenbendazole, pyrantel, and even macrocyclic lactones, compromising treatment efficacy and complicating infestation management (Martin *et al.*, 2024; Raza *et al.*, 2019).

Conclusion

This study reveals a contrasted parasitological situation in horses at the Eastern Equestrian Club in Constantine. Although the overall prevalence of infestations (50 %) and the intensity of parasitic excretion (mostly low according to Ambrosi and Euzéby classifi-

cation) indicate generally effective sanitary control, the diversity of identified species highlights the persistence of non-negligible parasitic risks. The predominance of strongyles (60 % of positive cases), confirming their status as major parasites in equids, is accompanied by the notable presence of other parasitic species.

This diversity, combined with the occasional detection of light burdens (up to 380 EPG), highlights the limitations of current deworming protocols in the face of resilient parasite life cycles and possible anthelmintic resistance. The presence of *E. leuckarti*, although often asymptomatic in adults, calls for increased vigilance in more vulnerable foals.

These findings call for improved parasite management by combining regular diagnosis (including protozoa and helminths), targeted deworming, and the optimization of management conditions (hygiene, grazing). In the Algerian context, where equine parasitological data remain scarce, this study provides essential epidemiological insights to inform the adaptation of prevention strategies and emphasizes the need to monitor the emergence of resistance and strengthen biosecurity measures. Further investigations, including larger sample sizes and molecular analyses, would help refine these conclusions and optimize equine health in the region.

Conflict of Interest

The authors declare that they have no conflicts of interest.

References

- ALEGRE, R., MILANO, F. (2020): Helminths y protozoos gastrointestinales en equinos de Corrientes, Argentina. *Rev Vet*, 31(1): 85 – 88. DOI: 10.30972/vet.3114645
- AMBROSI, M. (1995): Parassitologia zootecnica [Zootechnical parasitology]. Bologna, Italy, Edagricole, 390 pp. (In Italian)
- ATTIA, M.M., OMAR, H.M. (2025): Gastric equine myiasis: Prevalence, pathogenesis, molecular and serological implications. *J Parasit Dis*, 49(3): 489 – 497. DOI: 10.1007/s12639-025-01782-7
- BEASLEY, A., ABBAS, G., HUGHES, K., EL-HAGE, C., JACOBSON, C., BAUQUIER, J., WILKES, E., CARRIGAN, P., CUDMORE, L., HURLEY, J., BEVERIDGE, I., NIELSEN, M., JABBAR, A. (2025): Australian guidelines for equine internal parasite management. *Aust Vet J*, 103(2): 151 – 158. DOI: 10.1111/avj.13424
- BOELOW, H., KRÜCKEN, J., VON SAMSON-HIMMELSTJERNA, G. (2023): Epidemiological study on factors influencing the occurrence of helminth eggs in horses in Germany based on sent-in diagnostic samples. *Parasitol Res*, 122(3): 749 – 767. DOI: 10.1007/s00436-022-07765-4
- DE SOUZA, P.N., BOMFIM, T.C., HUBER, F., ABBOUD, L.C., GOMES, R.S. (2009): 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*, 160(3–4): 327 – 333. DOI: 10.1016/j.vetpar.2008.10.103
- DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS (2017): Code of practice for the welfare of horses, ponies, donkeys and their hybrids. Presented to Parliament pursuant to section 15 of the Animal Welfare Act 2006. London, UK, Crown copyright, 38 pp.
- DUBEY, J.P., BAUER, C. (2018): A review of *Eimeria* infections in horses and other equids. *Vet Parasitol*, 256: 58 – 70. DOI: 10.1016/j.vetpar.2018.04.010
- EFREMOVA, E., MARCHENKO, V.A., SMERTINA, M. (2022): Distribution of helminths of the gastrointestinal tract of horses in Central Altai. *Sib Her Agric Sci*, 52(5): 89 – 97. DOI: 10.26898/0370-8799-2022-5-11 (In Russian)
- ELGHRYANI, N., MCOWAN, T., MINCHER, C., DUGGAN, V., DE WAAL, T. (2023): Estimating the prevalence and factors affecting the shedding of helminth eggs in Irish equine populations. *Animals (Basel)*, 13(4): 1 – 11. DOI: 10.3390/ani13040581
- EUZÉBY, J. (1981): Diagnostic expérimental des helminthoses animales (animaux domestiques, animaux de laboratoire, primates): travaux pratiques d'helminthologie vétérinaire [Experimental diagnosis of animal helminthoses (domestic animals, laboratory animals, primates): practical work in veterinary helminthology]. Paris, France, Ministère de l'Agriculture, 349 pp. (In French)
- GEHLEN, H., WULKE, N., ERTOLT, A., NIELSEN, M.K., MORELLI, S., TRAVERSA, D., MERLE, R., WILSON, D., SAMSON-HIMMELSTJERNA, G.V. (2020): Comparative analysis of intestinal helminth infections in colic and non-colic control equine patients. *Animals (Basel)*, 10(10): 1 – 13. DOI: 10.3390/ani10101916
- GOLSHANG, J.G., NANVYAT, N., EDEH, E.R., PATROBAS, M.N., OSHADU, D.O., DISHION, C.H., DZIKWI-EMENNA, A.A., OTAKPA, E.O., IMANDEH, G.N., LOMBIN, L.H. (2024): Validation of FECPAKG2 equipment and prevalence of equine gastrointestinal parasites in Polo horses in Plateau State, Nigeria. *Anim Dis*, 4: 43. DOI: 10.1186/s44149-024-00149-4
- GORJI, F.F., SADR, S., BORJI, H. (2023): Epidemiological study on equine coccidiosis in North and Northeast of Iran. *Vet Med Sci*, 9(5): 2038 – 2041. DOI: 10.1002/vms3.1197
- GÜLEĞEN, E., GİRİŞGİN, O., GİRİŞGİN, A.Ö., CİRAK, V.Y. (2016): *Eimeria leuckarti* infections in sport horses in Northwest Turkey. *Berl Munch Tierarztl Wochenschr*, 129(1–2): 52 – 55. PMID: 26904897
- HINNEY, B., WIRTHELE, N.C., KYULE, M., MIETHE, N., ZESSIN, K.H., CLAUSEN, P.H. (2011): Prevalence of helminths in horses in the state of Brandenburg, Germany. *Parasitol Res*, 108(5): 1083 – 1091. DOI: 10.1007/s00436-011-2362-z
- JÜRGENSCHELLERT, L., KRÜCKEN, J., BOUSQUET, E., BARTZ, J., HEYER, N., NIELSEN, M.K., VON SAMSON-HIMMELSTJERNA, G. (2022): Occurrence of strongylid nematode parasites on horse farms in Berlin and Brandenburg, Germany, with high seroprevalence of *Strongylus vulgaris* infection. *Front Vet Sci*, 9: 1 – 18. DOI: 10.3389/fvets.2022.892920
- KAPLAN, R.M., NIELSEN, M.K. (2010): An evidence-based approach to equine parasite control: It ain't the 60s anymore. *Equine Vet Educ*, 22(6): 306 – 316. DOI: 10.1111/j.2042-3292.2010.00084.x
- LYONS, E.T., TOLLIVER, S.C. (2004): Prevalence of parasite eggs (*Strongyloides westeri*, *Parascaris equorum*, and strongyles) and oocysts (*Eimeria leuckarti*) in the feces of Thoroughbred foals on

- 14 farms in central Kentucky in 2003. *Parasitol Res*, 92(5): 400 – 404. DOI: 10.1007/s00436-003-1068-2
- MARTIN, F., HALVARSSON, P., ALM, Y.H., TYDÉN, E. (2024): Occurrence of fenbendazole resistance in *Parascaris* spp. on breeding farms in Sweden. *Vet Parasitol*, 331: 1 – 6. DOI: 10.1016/j.vetpar.2024.110272
- MOLENTO, M.B., PIRES, L.S.A., DALL'ANESE, J., YOSHITANI, Ú.Y., ALMEIDA, T. (2024): Prevalence and risk factors of gastrointestinal helminths infection in Brazilian horses: A retrospective study of a 12-year (2008–2019) diagnostic data. *Res Vet Sci*, 173: 105272. DOI: 10.1016/j.rvsc.2024.105272
- MULAW BERIHUN, A.M., BIZU, F., MARU, M., KASSAW, S. (2024): Prevalence, associated risk factors, and identification of the genera of equine strongyles in horses and donkeys in and around Bishoftu, Ethiopia. *Vet Med Int*, 2024: 3224113. DOI: 10.1155/vmi/3224113
- NEGASH, W., ERDACHEW, Y., DUBIE, T. (2021): Prevalence of strongyle infection and associated risk factors in horses and donkeys in and around Mekelle City, northern part of Ethiopia. *Vet Med Int*, 2021: 9430824. DOI: 10.1155/2021/9430824
- NIELSEN, M.K. (2012): Sustainable equine parasite control: Perspectives and research needs. *Veterinary Parasitology*, 185: 32 – 44. DOI: 10.1016/j.vetpar.2011.10.012
- NIELSEN, M.K., REINEMEYER, C.R., DONECKER, J.M., LEATHWICK, D.M., MARCHIONDO, A.A., KAPLAN, R.M. (2014): Anthelmintic resistance in equine parasites – Current evidence and knowledge gaps. *Vet Parasitol*, 204(1–2): 55 – 63. DOI: 10.1016/j.vetpar.2013.11.030
- OLCZAK, K., TOMCZYK-WRONA, I. (2022): Modern aspects of horse welfare. *Rocz Nauk Zoot*, 49(1): 3 – 19. (In Polish)
- RAZA, A., QAMAR, A.G., HAYAT, K., ASHRAF, S., WILLIAMS, A.R. (2019): Anthelmintic resistance and novel control options in equine gastrointestinal nematodes. *Parasitology*, 146(4): 425 – 437. DOI: 10.1017/S0031182018001786
- REHBEIN, S., VISSER, M., WINTER, R. (2013): Prevalence, intensity and seasonality of gastrointestinal parasites in abattoir horses in Germany. *Parasitol Res*, 112(1): 407 – 413. DOI: 10.1007/s00436-012-3150-0
- REHMAN, T.U., SAEED, Z., ZAMAN, M.A., SIKANDAR, A., ALI, H.M. (2021): Factors influencing the incidence of *Eimeria leuckarti* in horses. *Agrobiol Rec*, 6: 13 – 17. DOI: 10.47278/journal.abr/2021.004
- RELF, V.E., MORGAN, E.R., HODGKINSON, J.E., MATTHEWS, J.B. (2013): Helminth egg excretion with regard to age, gender and management practices on UK Thoroughbred studs. *Parasitology*, 140(5): 641 – 652. DOI: 10.1017/S0031182012001941
- RENDLE, D., HUGHES, K., BOWEN, M., BULL, K., CAMERON, I., FURTADO, T., PEACHEY, L., SHARPE, L., HODGKINSON, J. (2024): BEVA primary care clinical guidelines: Equine parasite control. *Equine Vet J*, 56(3): 392 – 423. DOI: 10.1111/evj.14036
- SAZMAND, A., BAHARI, A., PAPI, S., OTRANTO, D. (2020): Parasitic diseases of equids in Iran (1931–2020): A literature review. *Parasit Vectors*, 13(1): 1 – 19. DOI: 10.1186/s13071-020-04472-w
- SHRUBB, J., ROBINSON, N., RENDLE, D., SCHOFIELD, I., SCOTT, C., CRABTREE, J., HUNTER, G., DEAN, R., PARKER, R., MAIR, T. (2025): Project WORMS (working to overcome resistance and make for a sustainable future): Horse owner survey on equine parasite control in the UK. Part 1. Management factors. *Equine Vet Educ*, 37(3): 145 – 156. DOI: 10.1111/eve.14112
- SOTIRAKI, S.T., BADOUVAS, A.G., HIMONAS, C.A. (1997): A survey on the prevalence of internal parasites of equines in Macedonia and Thessalia-Greece. *J Equine Vet Sci*, 17(10): 550 – 552. DOI: 10.1016/S0737-0806(97)80228-6
- STRATFORD, C.H., LESTER, H.E., MORGAN, E.R., PICKLES, K.J., RELF, V., MCGORUM, B.C., MATTHEWS, J.B. (2014): A questionnaire study of equine gastrointestinal parasite control in Scotland. *Equine Vet J*, 46(1): 25 – 31. DOI: 10.1111/evj.12101
- TAVASSOLI, M., DALIR-NAGHADEH, B., ESMAEILI-SANI, S. (2010): Prevalence of gastrointestinal parasites in working horses. *Pol J Vet Sci*, 13(2): 319 – 324
- TAYLOR, M.A., COOP, R.L., WALL, R.L. (2016): *Veterinary Parasitology*. 4th Edition, Chichester, UK, John Wiley & Sons, Ltd, 488 pp.
- THIENPONT, D., ROCHETTE, F., VANPARIJS, O.F.J. (2003): *Diagnosing Helminthiasis by Coprological Examination*. 3rd Edition, Beerse, Belgium, Janssen Animal Health, 215 pp.
- WARAN, N. (Ed.) (2007): *The Welfare of Horses*. Animal Welfare, Volume 1. Dordrecht, The Netherlands, Springer, 225 pp.
- WARAN, N., EVANS, L. (2024): Good welfare for equids. White Paper. Eurogroup for Animals, The Donkey Sanctuary, Ippohesis, Animal Welfare Foundation, Tierschutzbund Zürich, Deutscher Tierschutzbund, World Horse Welfare, 90 pp.