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Prevalence and Risk Factors of Gastrointestinal Parasites in Horses in Aljabal Alakhdar region, Libya

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Prevalence, Gastrointestinal parasites, *Cyathostomins*, Faecal egg count, Libya.

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ABSTRACT

Libyan equines play an important role in traditional culture, and like all grazing animals, they often suffer from gastrointestinal parasite infections, especially in breeding facilities. These infections can lead to serious health problems and financial losses. In eastern Libya, data on these parasitic populations are limited due to limited research; therefore, this study aimed to identify the gastrointestinal parasites in horses in the region. Fresh faecal samples were collected from 110 horses in various parts of Al Jabal Al Akhdar to investigate prevalence, risk factors, and genera of equine gastrointestinal parasites. The flotation technique and the concentration-modified McMaster method were used to perform faecal egg count analysis to estimate the number of faecal eggs per gram. The overall prevalence of gastrointestinal parasites in horses was 59.09%, with *Cyathostomins* species the most prevalent, found in 58.18% of cases. *Parascaris* species was present in 3.64%, and *Oxyuris equi* in 2.73% of infected horses. Both *Eimeria* species and *Gasterophilus* species were found in 0.91% of the examined cases, indicating they were relatively uncommon. The current study found that the main factors significantly affecting the prevalence and egg faecal count of gastrointestinal parasites in horses are gender, breeding type, and body condition. However, no significant associations were observed with the regions, seasons, deworming practices, ages, or breeds of the infected animals. In conclusion, gastrointestinal parasite infections present a considerable health risk to equines in the research area. Efforts should be directed toward improving housing and food conditions, increasing welfare awareness, and implementing seasonal anthelmintic management.

1. INTRODUCTION

Arabian horses are truly unique animals, symbolising power, gentleness, and the beauty of their physical strength. These animals have played a significant role in Libyan culture, where traditional horse riding, known as El Maiz, is the country's most popular equestrian activity. It is also the leading sport for Arabian horses, highlighting the importance of horses in Libyan heritage and identity (Libya, 2020; Marshall, 2001) especially in northeastern Libya, known as Al Jabal Al Akhdar. This region is one of the country's most vegetated, with a typical environment that supports a traditional grazing system for horses and livestock, serving as a primary food source (Alsanousi *et al.*, 2025; Alsanousi & Mohammed, 2024).

Many factors impact the health and welfare of equines, including nutrition, management practices and diseases (Noble, 2023). Gastrointestinal parasites (GI) infections are a common issue in horses and, in many cases, are unrecognised, especially among grazing animals (Lu *et al.*, 2025). This issue arises from several factors that contribute to underdiagnosis, including the limited use of faecal egg counts (FEC), and many veterinarians and owners rely on systematic calendar treatments rather than evidence-based methods. Also, poor pasture hygiene practices, such as occasional faeces removal and restricted rotational grazing, result in higher parasite burdens (Lind *et al.*, 2007; Sallé & Cabaret, 2015) The most significant GI parasites affecting horses are nematodes, including *Strongylus* spp. (large strongyles/redworms), *Cyathostomins* spp. (small Strongyles*)*, *Ascarids* (*Parascaris* spp.), *Oxyuris* (*Oxyuris equi*), known as pinworms, *Eimeria* spp., *Gasterophilus* spp. (botfly larvae), and Cestodes, common tapeworms (*Anoplocephala* spp.). (Taylor *et al.*, 2016). These GI parasites generally have a direct life cycle except for *Anoplocephala* spp. They can contaminate grassland and lead to infections in susceptible equines. This problem has worsened in many cases due to insufficient rotational grazing and infrequent cleaning of faeces, leading to decreased pasture hygiene and an increase in parasite burdens (Larsen *et al.*, 2002; Lind *et al.*, 2007). However, there is limited data on common diseases and factors affecting the health of domestic animals, including horses, especially in the eastern area of the country, Al Jabal Al Akhdar region. This is due to insufficient scientific research on diseases, especially parasitic infections, which greatly affect the health of these animals. Similarly, the scarcity of information is mainly caused by the absence of a comprehensive record system and the limited diagnostic parameters used in routine examinations at both public and private veterinary clinics. Therefore, this investigation aims to detect various types of gastrointestinal parasites and their prevalence in horses in Al Jabal Al Akhdar region, Libya. This would provide reliable published scientific data on equine GI parasites in northeastern Libya.

2. METHO

2.1 Study area, collection of faecal samples and laboratory examinations

The present study collected samples from various stables in the Aljabal Alakhdar region, and samples were taken only once from each stable. The location and significance of the study area have already been described previously (Alsanousi *et al.*, 2025; Alsanousi & Mohammed, 2024). Between May 2022 and June 2023, fresh equine faecal samples were collected directly from the rectum, and most of the animals appeared emaciated. A total of 110 samples were stored in labelled containers, transported, and kept at 4°C until examination in the Parasitology laboratory of the College of Veterinary Medicine at Omar Al-Mukhtar University. Forms were completed for each sample, recording the date of sample collection, age, sex, geographical location (mountain and coastal areas), management (whether the animals remained consistently outdoors or indoors, with or without access to an outdoor area), and parasite treatment (deworming or non-deworming). A quantitative method, the flotation test, was performed to detect eggs using saturated sodium chloride solution (NaCl; specific gravity: 1.2).

For all infection samples, the concentration-modified McMaster method was used to perform the faecal egg count analysis (FEC) to estimate the number of faecal eggs per gram (EPG) (Alsanousi *et al.*, 2025; Roepstorff & Nansen, 1998). Horses were divided into three classes based on the results of the laboratory analysis and their excretion, as suggested by (Scala *et al.*, 2020) adapted as follows:

1) <200 EPG infection;
2) ≥200 ≤ 600 EPG moderate infection;
3) >600 ≥1000 EPG high infection.

Faecal culture was performed using positive samples as described by Santos et al (2018) (Santos *et al.*, 2018). The morphological characteristics of *Cyathostomins* spp. (small strongyles) (eggs and larvae*)*, *P.* equorum (eggs), *O. equi* (eggs), *A. perfoliata* (eggs), *E. leuckarti* (oocysts) and *Gasterophilus* spp. (larvae) were identified according to Taylor et al., Zajac et al., Foreyt, and the ESCCAP guideline ((ESCCAP). 2019; Foreyt, 2001; Taylor *et al.*, 2016; Zajac *et al.*, 2021).

Faecal samples were examined macroscopically to identify *Gasterophilus* larvae, and a light microscope (CX21FS1-Olympus Optical Co., Ltd., Tokyo, Japan) was used to investigate and recognise the parasite's stages at 10x and 40x magnification. To study the age, animals were separated into three groups: young < 4 years, adult 4-9 years and old > 9 years (Mangassa & Tafese, 2016). The study population included local and mixed horse breeds, which were managed using traditional husbandry methods, and their body condition was categorised as either good or poor based on a general estimation of the animals' bodies.

2.2 Statistical Analysis

The collected EPG data were entered into a Microsoft Excel worksheet (Windows version 21). A statistical analysis was performed using IBM SPSS software version 21, and the descriptive statistics, such as percentages, were used to indicate the prevalence of parasite infections. The Chi-square test (χ^2) was used to detect an association between factors and the prevalence of GI parasites. All results were considered statistically significant at $P \leq 0.05$, and 95% confidence levels were calculated.

3. ETHICAL APPROVAL

The chairman of the Al-Mukhtar Committee for Biosafety and Bioethics (MCBB) evaluated and approved the methodology of the study (NBC: 007.A. 25. 33).

4. RESULT

The overall infection rate of infected animals was 59.09% (65/110) from different farms in the Aljabal Alakhdar region, where more than half of the infected horses (51.18%; 57/110; 95% CI: 538.63-1314) were single infections, while just eight animals (7.3%) were mixed infections (Fig. 1).

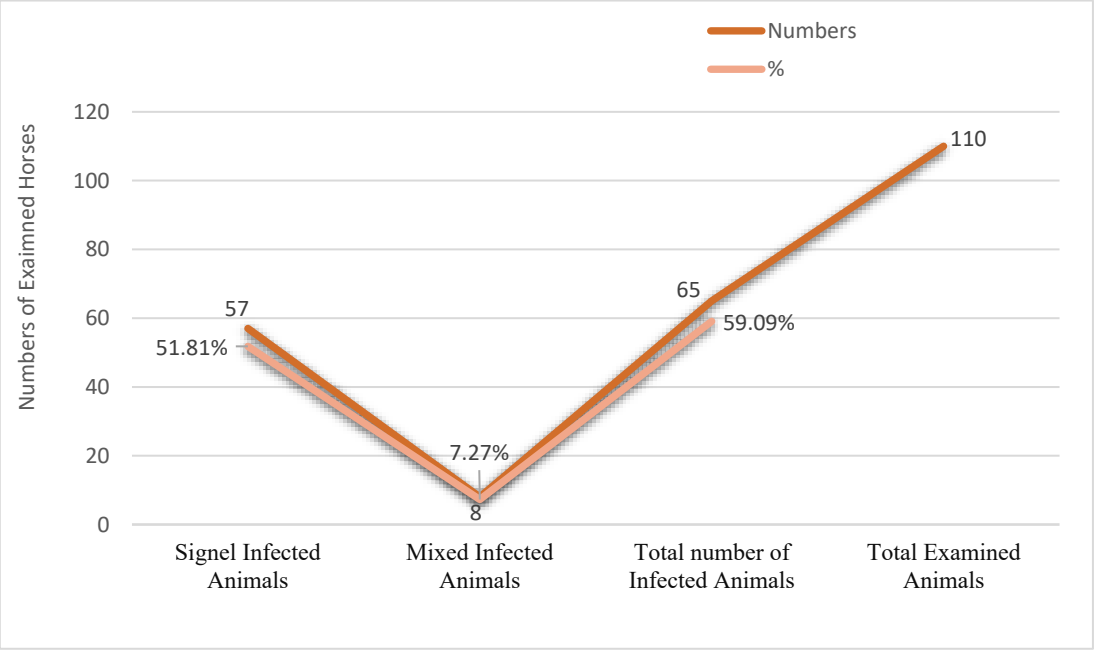

Fig 1. A total of animals was examined from different stables showing single and mixed infection.

The prevalence of *Cyathostomins* spp. eggs were presented in 58.18% (64/110), with a mean of 527 EPG (S.E. 110.43; 95% CI: 308.2-745.9) and a mean intensity of 915 EPG (S.E. 175; 95% CI: 565.3-1264.7) (Table 1). *P. equorum* was found in four animals, and *O. equi* in three horses, while *A. perfoliata* and *E. leuckarti* were observed only in one horse. All these parasites were combined infections with small strongyles, but *Gastrophilus* spp. was detected in one horse without small strongyles infection (Table 1). *Cyathostomins* spp. worms were the most dominant type in the 110 GI samples collected. Horses with strongyle FEC > 600 and ≥ 1000 EPG (22.7%), considered highly infected, were more prevalent than animals with a mean strongyle < 200 EPG (18.1%), classified as having low infection, and those with ≥ 200 and ≤ 600 EPG (17.3%), indicating moderate infection, which shows a significant difference ($p < 0.000$) (Fig. 2). The prevalence of infected horses with egg excretion among *Parascaris* spp., *O. equi*, *A. perfoliata*, *E. leuckarti*, and *Gastrophilus* spp. was remarkably low (Fig. 2).

Table 1. The prevalence of various gastrointestinal parasites (GI) infections from different locations in Aljabal Alakhdar, Libya.

Horses Infected with Various Gastrointestinal Parasites (GI)						
***Cyathostomins* spp. (small strongylus)**		***Parascaris* spp.**	***Oxyuris equi***	***Anoplocephala* spp.**	***Eimeria leuckarti***	***Gastrophilus* spp.**
Number of Infected Animals	64	4	3	1	1	1
Prevalence %	58.18%	3.64%	2.73%	0.91%	0.91%	0.91%
Mean intensity (EPG)*	915	175	1060	-	-	-
Std. error of mean	175	104.04	970.15	-	-	-
95% confidence interval	565.29-1264.71	0-506.11	0-5234.24	-	-	-

*Eggs per gram

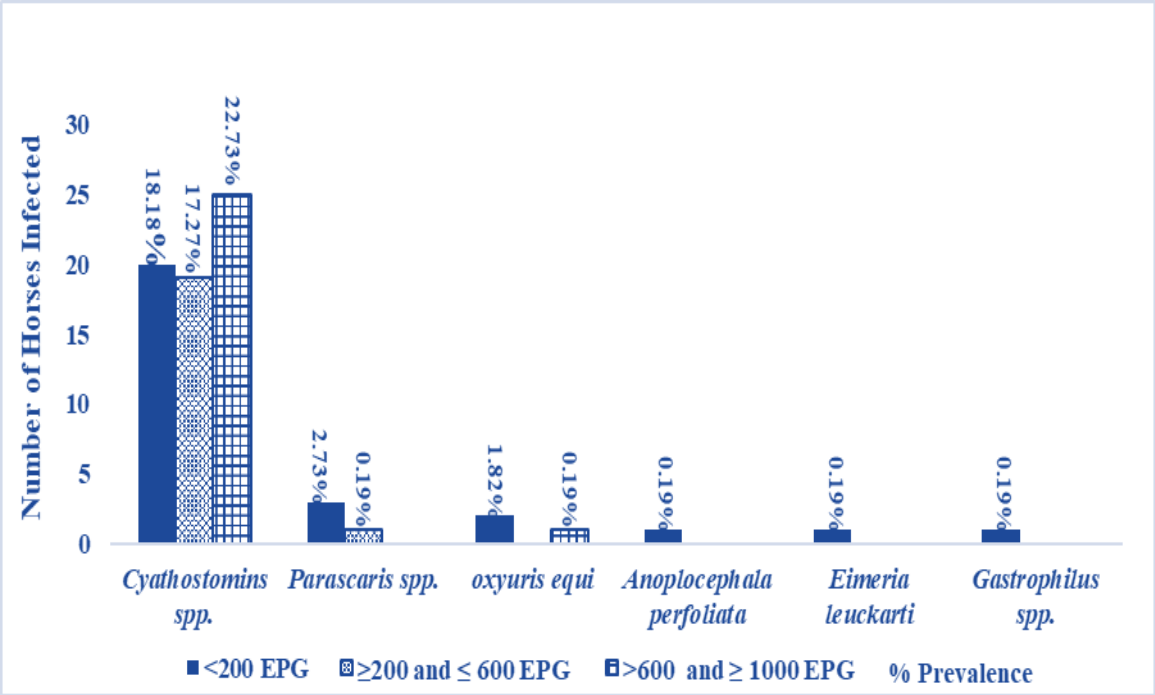

Fig. 2. Gastrointestinal parasite eggs count per gram of faeces (EPG) with a flotation solution applied to a modified McMaster technique in faecal samples collected from horses in Aljabal Alakhdar area, Libya.

The current results revealed that the difference between the infected genders was statistically significant ($p < 0.008$), with the highest prevalence of GI parasite infection observed in females (45/65, 69.23%) compared to males. Horses bred outdoors had a higher rate of infection (60/90, 66.67%) than horses bred indoors, indicating a significant ($p < 0.001$) effect of breeding environment. Additionally, the body condition of the animals was statistically significant ($p < 0.011$), which plays a crucial role in GI parasite infection, as horses with good body condition (22/48, 45.83%) had the lowest infection rate compared to those in poor body condition (43/69, 62.32%) (Table 2). However, no significant statistical differences in the prevalence of GI parasites were detected among the examined equines in the region, age, season, treatment, or breeds (Table 2).

Table 2. Risk factors associated with the prevalence of gastrointestinal parasites (GI) detected in faecal samples collected from naturally infected equines.

parameters	Animals Examined (n)	Positive (%)	COR (%)	CL 95%	P-value
Regions					
Mountain region	69	42 (60.87)	1.33	0.61-2.91	0.384
Cost region	41	23 (56.10)	**Reference**		
Age					
young	37	24 (64.86)	1.52	0.66-3.52	0.586
Adult	62	34 (54.84)	**Reference**		
Old	11	7 (63.64)	1.44	0.38-5.42	
Gender					
Female	65	45 (69.23)	2.81	1.28-6.19	**0.008**
Male	45	20 (44.44)	**Reference**		
Seasons					
Winter	29	14 (48.28)	**Reference**		0.324
Spring	38	24 (63.16)	1.84	0.72-4.72	
Summer	16	12 (75.00)	3.21	0.87-11.9	
Autumn	27	15 (55.56)	1.34	0.53-3.36	
Type of breeding					
Outdoors	90	60 (66.67)	6.0	1.99-18.1	**0.001**
Indoors	20	5 (25.00)	**Reference**		
Body of condition					
Good	48	22 (45.83)	**Reference**		**0.011**
Poor	62	43 (69.35)	2.67	1.22-5.85	
Treatment					
NDW	94	57 (60.64)	1.54	0.53-4.47	0.297
DW	16	8 (50.00)	**Reference**		
Breeds					
Local	105	63 (60.00)	2.25	0.36-14.04	0.33
Mixed	5	2 (40.00)	**Reference**		

COR=crude odds ratio, CL 95%=confidence interval.

Eggs of equine strongylids, including *Cyathostomins* spp. (small strongyles), they are similar in appearance across species and are indistinguishable from Strongylus spp. (large strongyles) eggs under routine microscopic examination. *Cyathostomins* spp. eggs are oval and thin-shelled, surrounding a central group of 8 to 16 cells (morula), and are variable in size, approximately 60-120 x 35-60 (Fig. 1a, 1b and 1c) (Zajac & Conboy, 2012). Horses are often infected with *Parascaris* spp., an equine ascarid, whose eggs are round to oval, deeply pigmented, and have a thick shell with a finely granular surface. Eggs are passed in faces containing a single cell (egg on the right with one black star, Fig. 2a). Some *Parascaris* spp. eggs may shed their rough, proteinaceous coating on the eggshell (egg on the left, Fig. 2a), and the egg undergoes the first cell division (Fig. 2a, egg with two black stars). Figures 2a and 2b show ascarid eggs undergoing different stages of cell division, while Fig. 2c displays a larvated *Parascaris* egg (L2). The faecal sample containing these eggs was taken fresh, but it was not examined for some time, allowing for the development to occur. *Oxyuris equi* eggs, horse pinworms, are ovoid, asymmetrical and feature an operculate plug on one side (indicated by the white arrow). Eggs can rapidly develop into late-stage morula or first-stage larvae when the females lay them (Fig. 3). Oocysts of *Eimeria leuckarti*, an equine coccidian, are pyriform with a thick dark shell that is flattened at the smaller end, and features a distinct micropyle (black arrow).

These large-sized deep brown oocysts can be distinguished with a flotation producer (Fig. 4). The eggs of the tapeworm, *Anoplocephala* spp. resemble those of the ruminant tapeworms, *Moniezia* spp., and are irregularly spherical or triangular in shape, containing an embryo with six hooks (hexacanth) and surrounded by a pyriform apparatus (black arrow head) (Fig. 5) (Taylor *et al.*, 2016; Zajac & Conboy, 2012; Zajac *et al.*, 2021). Multiple gastrointestinal helminth species infections with *Eimeria leuckarti*, Strongyles spp. (large or small) and *Parascaris* spp. (white arrows) are depicted in Figures 6 and 7. Horses are commonly affected by more than one type of gastrointestinal worm, especially with Strongyles and *Parascaris* (Ceylan *et al.*, 2020).

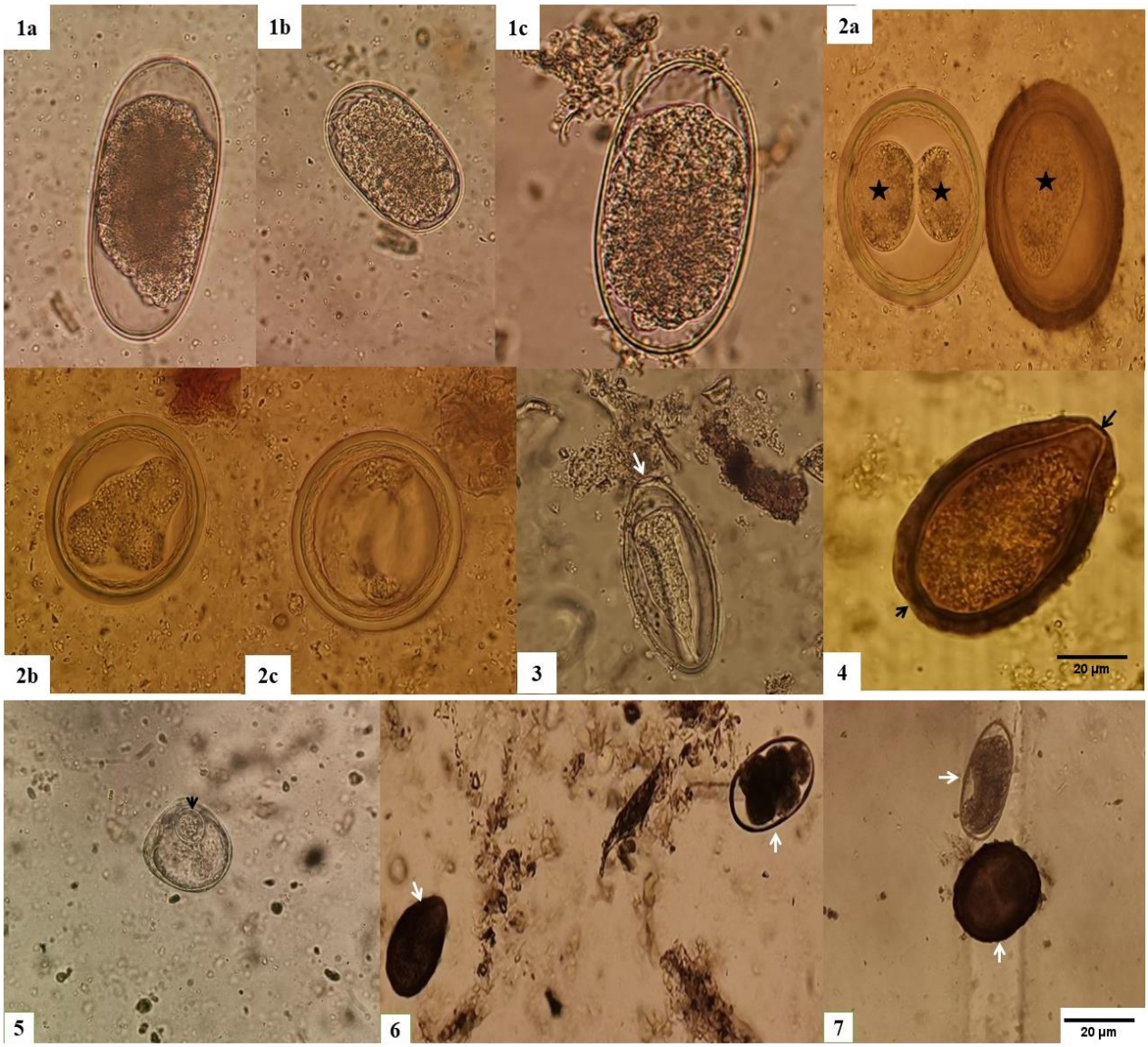

Fig 3. *Original pictures: morphological characteristics of eggs of Cyathostomins spp. (small strangles) which are distinguished in faecal samples of equine, they are oval, with a smooth, thin shell and contain a cluster of cells (1a, 1b & 1c); eggs of Parascaris spp. spherical, brown-yellowish with a thick albuminous shell covered with tiny dots, and contains one or two cells (black stars) (2a); an embryonated egg with four cells of Parascaris spp. (2b); egg of Parascaris spp. containing L2 (infective stage); Oxyuris equi egg containing L1 with one opercular plug (white arrow) (3); Unsporulated oocyst of E. leuckarti, short black arrow points to an enlarged region in the inner layer of the oocyst wall, situated opposite the micropyle (long black arrow) (4); Egg of Anoplocephala spp. with hexacanth embryo inside the pyriform apparatus (arrow black head) (5); Parascaris spp. egg next to a typical strongylus spp. egg suggests that a horse has been infected with more than one species of gastrointestinal parasite (white arrows); another faecal sample shows a mixed infection with eggs of strongylus spp. and Parascaris spp. (white arrows) (7). Original magnification 400x, bar = 20 µm. All images were captured by the authors.*

In all infected samples in this study, L3 of *Cyathostomin* spp. obtained from faecal cultures was the most common larva, characterised by an elongated body, a tapering anterior section, a long tail ending with a long filament (Figs. 1A, 1B and 1C), and Intestinal Cells (IC) distinguishable under the microscope. Based on the arrangement of intestinal cells, there are eight different *cyathostomum s.l.* types, and Fig.1A shows type G in which eight IC are arranged in an unclear pattern with rectangular and/or elongated triangular shapes (Santos *et al.*, 2018). However, L3 in Figs. B and C have different arrangements, numbers, and shapes of the IC, which present other types of *Cyathostomin spp*. (Amer *et al.*, 2022).

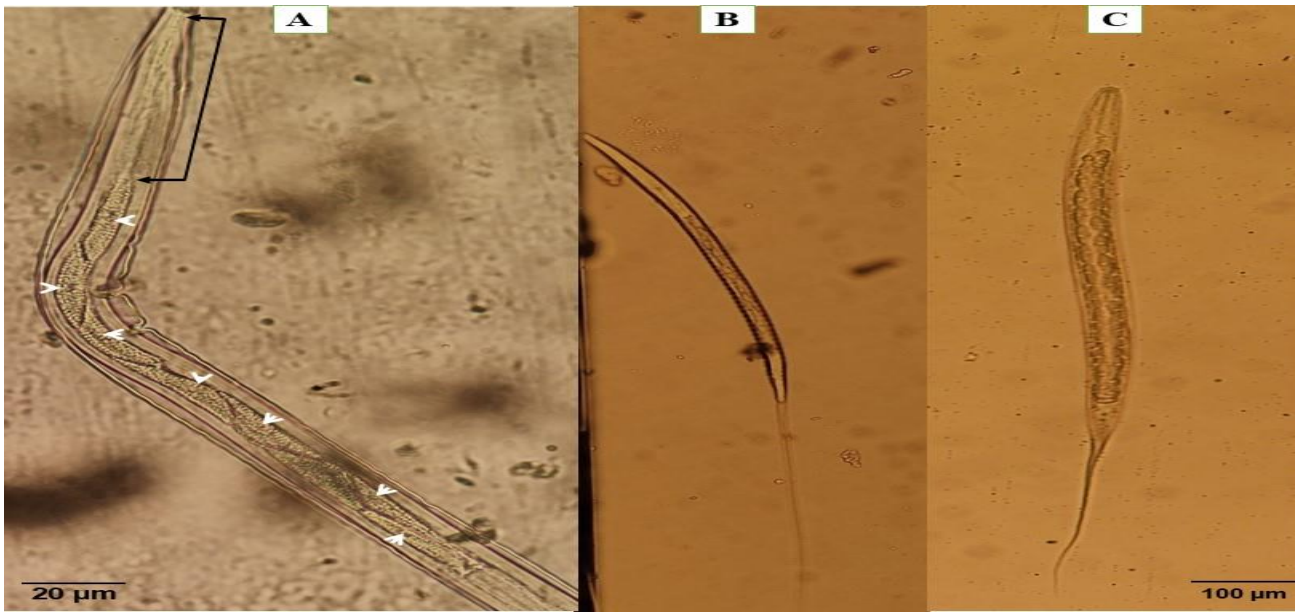

Fig. 4. Original pictures: morphological characteristics of different third-stage larva (L3) of *Cyathostomin* spp. according to the arrangement of the Intestinal Cells (CI) showing eight triangular cells (white arrows), and a tapering anterior section (black bar), original magnification 400x, bar = 20 µm (A); the posterior portion of the sheath of the larvae has a long filament (B & C), original magnification 100x, bar = 100 µm. All images were taken by the authors.

5. DISCUSSION

The data on the prevalence of GI parasites (helminths and protozoa) in horses in East Libya, particularly in the Al Jabal Al Akhdar region, are not widely documented in the literature. To our knowledge, this is the first study on East Libyan horses, attempting to identify the epidemiological aspects, risk factors affecting GI helminth infection, and assess the prevalence of these equine GI parasites. Recently, there has been an increase in the number of stables of various sizes and management types throughout Al Jabal Al Akhdar region, East Libya; thus, equine health and their performance are significantly affected by the risk of GI parasite infection. In some parts of the world, the prevalence proportion of horses infected with GI parasites ranged under 50% of the prevalence (Egypt 15% (Abd-Elrahman *et al.*, 2021), Nigeria 39.3% (Mohammed *et al.*, 2025), Italy 39.5% (Scala *et al.*, 2020), Pakistan 45.1% (Tahir *et al.*, 2016), Mexico 47.2% (Romero *et al.*, 2020), Russia 47.5% (Panova *et al.*, 2023), and Ethiopia 48.17% (Mangassa & Tafese, 2016)), while other parts were documented above 50% of the prevalence (Irland 52% (Elghryani *et al.*, 2023), China 66.3% (Lu *et al.*, 2025), Thailand 74.7% (Phetkarl *et al.*, 2024), Libya 98% (Elmajdoub *et al.*, 2022), and Poland and Turkey 100% (Ceylan *et al.*, 2020; Slivinska *et al.*, 2009).

The total prevalence of GI parasite infection observed in the present study was 59.09%, which is higher than the prevalence reported in studies with values below 50%. However, this is still within the range of values found in other works with a high prevalence proportion above 50%. These differences are due to many factors that may have an impact on the variation in GI parasite rate, including farm/pasture management, stable hygiene, antiparasitic medications, horse age/breed, geographic location/climate, and immune response (Elghryani *et al.*, 2023; Malek *et al.*, 2025; Phetkarl *et al.*, 2024; Von Samson-Himmelstjerna *et al.*, 2009). In the present study, 51.18% of examined animals, more than half of the infected horses, exhibit a single infection with small strongyles helminths. In comparison, the remaining animals (7.3%) had mixed infections with two or more GI parasites, which could be a result of poor management systems.

The main GI parasite identified in the current study was *Cyathostomin* spp. (small strongyles) with 58.18% (64/110), this high rate of infection was documented globally by several previous studies, as in Europe, the UK, Italy, and Germany (Von Samson-Himmelstjerna *et al.*, 2009); Asia, China (Lu *et al.*, 2025) and Thailand (Phetkarl *et al.*, 2024)Africa, Ethiopia (Mulaw Berihun *et al.*, 2024) and Egypt (Amer *et al.*, 2022), and America, Mexico (Romero *et al.*, 2020) and USA (Relf *et al.*, 2013). While other researchers recorded a low prevalence rate of infection of *Strongyles* spp. such as the western region in Libya (Elmajdoub *et al.*, 2022) and Pakistan (Tahir *et al.*, 2016).

Overall, the strongyle EPG from all horses (n = 110 animals) was quite high, with a mean of 527 EPG (range: 0-8720 EPG). This mean was higher than that documented in the UK (Lloyd, 2009), but lower than that reported in Ireland (Elghryani *et al.*, 2023). However, the results of this study show that 22.73% of horses shed ≥ 1000 EPG, which is considered a high infection, and this may correlate with being untreated or irregularly treated with anthelmintic drugs (Lloyd, 2009).

Although many horses harbour high burdens of small strongyles across most regions, the majority of infected animals may exhibit subclinical signs and do not develop detectable sickness. It is also rare to find animals which exhibit overt clinical disease (Fleming *et al.*, 2020; Love *et al.*, 1999; Jacqueline B. Matthews *et al.*, 2023). Nevertheless, these GI nematodes can cause an inflammatory enteropathy affecting the caecum and colon, particularly in horses grazing on contaminated pastures without a routine deworming programme (Fleming *et al.*, 2020; Love *et al.*, 1999).

Current data indicate a low prevalence of *Parascaris* spp. at 3.64%. This finding aligns with previous studies reporting prevalence rates of 2.4%, 3.8%, and 4.22%, as noted by Elghryani *et al.*, Phetkarl *et al.*, and Lu *et al.*, respectively (Elghryani *et al.*, 2023; Lu *et al.*, 2025; Phetkarl *et al.*, 2024). In contrast, other researchers in Nepal and the UK reported much higher rates of *Parascaris* spp., at 14.28% (Devkota *et al.*, 2021) and 50% (Lloyd, 2009), respectively. In the current findings, other GI helminths were detected at low prevalence, including *Oxyuris equi* (2.73%), while *Anoplocephala* spp., *Eimeria leuckarti*, and *Gastrophilus* spp. recorded the same rate (0.91%), these results are also similar to other studies (Romero *et al.*, 2020) (Elghryani *et al.*, 2023; Phetkarl *et al.*, 2024).

Based on the findings of the current investigation, the risk factor analysis for GI parasite infections revealed that there was no significant association found between regions, seasons, deworming practices, ages, or breeds of the infected horses. Regarding the region data, in line with the findings of Devkota *et al*. (Devkota *et al.*, 2021) who reported a lack of association between the regions, while Mangassa *et al*. (Mangassa & Tafese, 2016) and Villa-Mancera *et al.*(Villa-Mancera *et al.*, 2021) found a relation between the variation prevalence rates and the study areas. This could be attributed to the similarity in animal management systems, the agroecological characteristics of the study areas, and the epidemiology of the GI parasites. Also, the temperate climate in previous works has a significant impact on the GI parasite rates, in which spring and summer are perfect conditions for the development and spread of the infective stage of GI parasites on the grassland (Elghryani *et al.*, 2023; Scala *et al.*, 2020). In contrast with the earlier literature, seasonal changes did not significantly affect the GI parasite prevalence rate in this investigation, and it is consistent with previous studies in China (Lu *et al.*, 2025), Egypt (Abd-Elrahman *et al.*, 2021), Mexico (Romero *et al.*, 2020), Colombia (Pinilla *et al.*, 2025), and Italy (Scala *et al.*, 2021). The absence of seasonality of GI parasites in Libyan horses may be linked to the resistance of infective eggs in the environment and the Mediterranean climate characteristic of northeastern Libya, which is similar to that in Italy (Scala *et al.*, 2021).

This study found no significant differences between treated and untreated horses, and the findings indicated a notable lack of anthelmintic use, as only 16 of the 110 examined animals received treatment. This situation helps to explain the high prevalence rates of GI parasites among the horses in the study area. Moreover, despite the regular use of anthelmintics, the prevalence of GI parasites remains high or stable (50% of treated animals testing positive), raising questions about the drug's resistance and management methods. Several studies have globally highlighted the growing concern of anthelmintic resistance of GI parasites in horses due to the independent development of resistance across drug classes. Additionally, they had demonstrated that GI parasite prevalence patterns, particularly those of *Cyathostomins* spp., have not changed significantly over the last four decades, despite the extensive use of broad-spectrum anthelmintics. They recommend that treatments be applied only when the faecal egg count (FEC) or serological tests confirm a high burden (Hedberg-Alm *et al.*, 2020; J. B. Matthews & Mair, 2025; Scala *et al.*, 2021). However, other studies have shown that when effective drugs are used with appropriate dosing and intervals, deworming can lead to remarkable reductions in GI parasite prevalence and egg shedding (Hildebrand *et al.*, 2023; Osterman-Lind *et al.*, 2023; Salem *et al.*, 2021). Therefore, Variations in management practices, type of anthelmintics, resistance levels, and study design may explain why some individual studies do not find a strong association.

The analysis of the current data revealed no significant effects of age and horse breed on overall equine GI parasite prevalence, indicating that both age and breed of horse are unreliable risk factors for exclusion; this could be due to the lower number of young animals and horse breeds. Thus, this finding aligns with previous research conducted in Mexico (Romero *et al.*, 2020), the UK (J. B. Matthews & Mair, 2025), Poland (Hildebrand *et al.*, 2023), and Serbia (Kukurić *et al.*, 2025). Unlike other studies, which emphasised that age is clearly and significantly associated with higher GI parasite egg shedding in horses, likely due to immature immunity (Elghryani *et al.*, 2023) (Boelow *et al.*, 2023), analysis by Kuzmina et al. found that brood horses have significantly higher EPG values than other breeds (Kuzmina *et al.*, 2016).
However, the current study revealed that the primary factors significantly influencing the prevalence and EFC of GI parasites in horses are gender, breeding type, and body condition. The sex of horses significantly influenced the intensity of GI parasite shedding, with females showing the highest prevalence (69%) compared with males, suggesting that pregnancy, birth and lactation may cause stress and reduce immunity, making mares more susceptible than stallions, as reported in previous surveys (Scala *et al.*, 2020) (Mohammed *et al.*, 2025) (Romero *et al.*, 2020) (Kornaś *et al.*, 2010). Additionally, the close and prolonged contact between mares and their foals may play a significant role in this process; indeed, foals are more effective at shedding eggs. This situation may also be attributed to stallions having less access to pasture, which places them at a lower risk of infection (Scala *et al.*, 2020) (Kornaś *et al.*, 2010).
The type of breeding also influences GI parasite burden, as the present study found that grazing animals had higher rates of parasite infection, where the use of permanent pasture can play an important role in increasing the risk of infections for horses, while practices such as removing rough (ungrazed grass round manure), collecting and disposing of manure from the pasture, or alternating grazing between horses and ruminants can help reduce these risks, as also reported by Scala *et al*, (Scala *et al.*, 2020) and Kornas et al, (Kornaś *et al.*, 2010).
The current study found a strong association between gastrointestinal parasites and poor body condition (69.35%), indicating that the prevalence of GI parasites is significantly influenced by body condition. This result is consistent with previous research indicating that horses with poor body condition are more likely to harbour higher parasite burdens compared to those in better condition, considering that body condition significantly influences the presence of GI parasites (Emeto *et al.*, 2022; Kumar *et al.*, 2024; Lu *et al.*, 2025; Mulaw Berihun *et al.*, 2024). However, some studies do not support body condition as a significant factor influencing GI parasites in horses (Boelow *et al.*, 2023), suggesting that the relationship may vary depending on the specific parasite or context (Merlin *et al.*, 2024). Overall, the evidence predominantly supports body condition as a significant risk factor, although there is some variation across populations.

6. CONCLUSION

The study reveals that horses in Al Jabal Al Akhdar region, eastern Libya, are commonly affected by GI parasites, with *Cyathostomins* spp. (small strongyles) being the predominant type, often found in mixed infections. The significant differences in infection rates among gender, type of breeding (indoor/outdoor), and body condition demonstrate the impact of environment and management factors. To effectively manage parasite prevalence issues, a comprehensive veterinary health plan, including preventive and control strategies, is essential to reduce the parasitic burden in the region. Also, collaboration between the public and private sectors is critical for horse breeders to implement effective hygiene procedures, regular effective anthelmintic treatments, and improved stable management. Additionally, to better understand the epidemiology of GI parasites, it is essential to conduct molecular characterisation and evaluate the resistance profile to anthelmintics.

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