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Assessment of internal parasite infection in horses from various farm types in the western area of Libya

Asem Ramadan Amar Mohamed [1 *], Ahmed Imbayyah Abdulqadir Ashteebah [2], Abdeulmajid Hossein Mohammed Khapoli [3]
[1,2,3] Veterinary Medicine Department, Faculty of Veterinary Medicine and Agriculture, University of Zawia, Al-Ajeelat, Libya

تقييم الإصابة بالطفيليات الداخلية في الخيول من مختلف أنواع المزارع في المنطقة الغربية من ليبيا

عاصم رمضان عمار محمد [1 *] ، احمد امبية عبد القادر اشطيبة [2]، عبد المجيد حسين محمد الخبولي [3]
[3،2،1] قسم الطب البيطري، كلية الطب البيطري والزراعة، جامعة الزاوية، العجيلات، ليبيا

[*]Corresponding author: as.mohamed@zu.edu.ly

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Abstract:
The study was carried out in 2023 (from April to October) in the western area of Libya. Horses from individual and horse racing stables with varying housing, feeding, and field care methods (including Arabian and Thoroughbred horses) had their feces sampled. 450 horses were analyzed (380 mares, 15 geldings, and 55 stallions).
Among the 300 horses from individual farms, 143 (47.6%) had protozoan infections, and 111 (37%) had gastrointestinal parasite infections. Thirty-one (20.6%) and 29 (19.3%) of the 150 horses from racing farms had protozoan infections and gastrointestinal parasite infections, respectively.
Most horses from individual farms and racing farms were infected with the gastrointestinal parasite *Moniezia* spp. and the protozoan *cryptosporidium parvum.*
The total number of horses from individual farms free of infection from gastrointestinal parasites was 189 (63%), and horses free of infection from racing farms were 121 (80.6%). While free from protozoa in individual farms 157 (52.3%) and from racing farms 119 (79.3%).
In some horses, eggs of *Trichostongyliode* spp. *Parascaris equorum*, and tapeworm of *Anoplocephala* spp., were found in the individual, and racing farms.
The horses from both individual and racing farms were infected with other protozoa: *Blantidum coli, Entamoeba coli, Eimeria* spp.
Individual farms had a higher number of infected horses than the horse racing stable farms.

Keywords: Horses, Helminths, Protozoa, Arabian horses, Thoroughbred horses, Libya.

الملخص
أُجريت الدراسة عام 2023 (من أبريل إلى أكتوبر) في المنطقة الغربية من ليبيا. أُخذت عينات من براز خيول من إسطبلات فردية وإسطبلات سباق خيول، ذات أساليب مختلفة في الإيواء والتغذية والرعاية الميدانية (بما في ذلك الخيول العربية والأصيلة). خُلِّل 450 حصانًا (380 فرسًا، و15 حصانًا مخصيًا و55 فحلًا).
من بين 300 حصان من مزارع فردية، كان 143 حصانًا (47.6%) مصابًا بعدوى الطفيليات الأولية، و111 حصانًا (37%) مصابًا بعدوى طفيليات معوية. كان 31 حصانًا (20.6%) و29 حصانًا (19.3%) من أصل ١٥٠ حصانًا من مزارع السباق مصابين بعدوى الطفيليات الأولية وعدوى طفيليات معوية، على التوالي.

أُصيبت معظم الخيول من المزارع الفردية ومزارع السباق بالطفيلي المعوي *Moniezia* spp. والطفيلي الأولي *Cryptosporidium parvum*.
بلغ إجمالي الخيول من المزارع الفردية الخالية من الإصابة بالطفيليات المعوية 189 (63%)، والخيول الخالية من الإصابة من مزارع السباق 121 (80.6%). في حين كانت خالية من الأوليات في المزارع الفردية 157 (52.3%)، ومن مزارع السباق 119 (79.3%).
في بعض الخيول، تم العثور على بيض *Trichostongyliode*. spp و *Parascaris equorum*، ودودة الشريط *Anoplocephala*. spp، في المزارع الفردية ومزارع السباق.
أُصيبت الخيول من كلٍّ من مزارع الفردية ومزارع السباق بأنواع أخرى من الطفيليات الأولية (*Blantidum coli*، *Entamoeba coli*، *Eimeria* spp.).
كان عدد الخيول المصابة في المزارع الفردية أعلى منه في مزارع إسطبلات سباق الخيل.

الكلمات المفتاحية: الخيول، الديدان الطفيلية، الأوآلى، الخيول العربية، الخيول الأصيلة، ليبيا.

Introduction

In recent years, Libya has seen a rise in the rearing of horses for various uses. Breeding, track racing, and participation in conventional equestrian competitions are some of the goals of raising. The equestrian industry's operations have undoubtedly increased significantly throughout the nation, particularly in the western part. Although there are currently no official statistics on the number of horses in Western Libya, the Thoroughbred, which originated in England in the early 1700s through crosses between Arabian-descended stallions and a group of mares of unknown origin, is believed to be the most common breed in the region [1].

Other horse breeds, including the pure Arabian, are present in Libya. The Libyan Association of Arabian Horses is primarily in charge of managing this breed locally. The Libyan horses, which are referred to as local throughout the book, are also crossbred horses with varying blood purity levels (50%, 75%, 87%, and 92%). Horses are friendly animals who like being near humans, and their significance has hardly decreased in recent years in regions of South America, Africa, Eastern Europe, and Asia [2].

But in Libya, the Horses are used for traditional equestrian celebrations and are frequently available. In the early 1960s, Libyan track and field events, run mainly by Arabian horses and Thoroughbreds, burgeoned after the 2000s, when the equestrian industry became noticeably more active. Horses' digestive systems are attacked by a variety of intestinal parasite species, which result in physical illness, reduced performance, and severe clinical diseases that can occasionally be fatal [3].

Also, the variation in the breeds of horses, such as Thoroughbreds and Arabian horses, impacts their resistance to parasites. This is true for the majority of animals, and according to some research, variations in animal or bird breeds have an impact on the hematological and biochemical properties of blood [4].

As herd animals, horses coexist peacefully with other animals of various sorts, including goats and sheep. Intestinal helminths are one of the main barriers to successful horse-rising worldwide [5]. Most horses occasionally have parasite infections, regardless of age, sex, or housing circumstances [6].

Tapeworms and small and large strongyles are common infections in adult horses. *Strongyloides westeri* and *Parascaris equorum* can also infect young animals, including foals [7]. In some studies conducted on sheep in Libya, parasites showed progressive immunity to some types of anthelmintics and not others [8].

Several variables, such as feeding circumstances and routine deworming, affect the prevalence of parasite infections. When horses graze on a pasture, they are more vulnerable to parasitic illnesses. When grazing land is not routinely cleared of manure, it can quickly turn into a haven for an increasing number of infectious larvae [9].

Some nutrients used as supplements can cause changes in blood levels of protein and cholesterol, Immunostimulants trigger the nonspecific or innate defensive systems against bacterial, viral, or cellular infections [10,11].

Young horses that frequently have coprophagia are more vulnerable to infection from adult carriers [12].

According to earlier research, the use of aromatic and therapeutic herbs reduces the growth and reproduction of intestinal parasites and also affects the animal’s body, its internal Carcass Characteristics, and Productive Performance[13].

Helminth eggs and larvae with excrement on pasture require temperature and moisture to grow and survive, which creates the perfect habitat for Nematode and Trematoda larvae to mature to the infected stage. [14].

The fecal-oral pathway, which is indirectly spread by touch, is how parasitic helminths spread. Furthermore, even in cases of severe infections, diagnosing gastrointestinal parasites by fecal analysis can be difficult. Additionally, transmission can occur between individuals, between animals, and between people.

Horse gastrointestinal parasites have been the subject of several investigations in numerous nations, such as Turkey [15], Western Australia [16], and Libya [17].

The goal of the current investigation was to identify the gastrointestinal parasite fauna in some horses that were grazing on various farms, individual and racing farms during the pasture season in the western area, of Libya.

Materials and Methods

Study area

The study was conducted in the western region of Libya, the State of Libya. The region is located 40 to 80 km west of Tripoli capital of Libya. The district comprises many farms. The horse populations are estimated to be around 5 to 10 heads per farm. The animals' housings are built near the farmers' homes.

Sources of samples

Ten farms were included in the research following the owner's visit to the veterinary care facilities. The samples were obtained from horses raised on farms in Zawia, West Zawia, and Surman cities. Fecal samples were taken from 50 individuals and 30 racing farms in the western area of Libya between March and the end of November 2023. Only one sample was taken from each farm.

Fecal samples were collected from 130 mares, 5 geldings, and 15 stallions at racing farms, and 250 mares, 10 geldings, and 40 stallions from individual farms, for a total of 450 horses were examined. None of the horses under examination had signs like colic, diarrhea, or other gastrointestinal issues that are unique to parasites.

These horses ranged in age from a few months to under fifteen years. On the individual farms, Arabian horses were the most common breed, but on racing farms, Arabian and Thoroughbred horses were mixed. The feeding and accommodation system in Libyan horse farms varies according to the type of horses, whether they are ordinary horses for pleasure, riding and breeding, or racing horses. Non-racing horses are usually fed twice daily on a concentrated diet of barley and bran, with regular hay meals during the day or grazing in the winter and spring. Racing horses are kept mostly inside and are often fed a three-times-concentrated diet and an (*ad libitum*) continuous hay diet, typically consisting of alfalfa and oat hay.

The majority of horses on individual farms had irregular deworming, typically as part of a veterinarian appointment for another reason. The majority of racing farms dewormed their horses twice, once in the spring (March–April) and once again in the fall (October–November). For deworming, 1% ivermectin was often utilized.

Collection of fecal samples

As soon as ten weeks following deworming, fecal samples were taken from the treated horses. Samples were taken from each horse just once. A total of 450 fecal samples were collected. About 10 grams of fresh fecal samples were collected directly from the rectum using disposable polythene gloves, kept in plastic sachets. Then, they were cooled down to the temperature of 4 ◦C for the time of transport and then transported to the laboratory for examination in the Research Laboratory belonging to the Faculty of Veterinary Medicine and Agriculture (Al-Ajeelat), University of Zawia.

Analysis of fecal samples

It often took less than two hours to transfer the gathered fecal specimens to the laboratory, where they were placed in chilled containers. After that, the samples were stored at 5°C in the refrigerator until the egg count was completed. The Direct Smear Method and Salt Flotation Technique were used to examine the fecal samples for the presence of helminth eggs. The specimens were examined with a Leica DM3000 microscope and imaging system. The (EPG) was conducted in a period that did not exceed five days after sample collection. Eggs per gram (EPG) were counted by using the Mac-Master Technique [18]. The examination and identification of helminthic ova were carried out by using a key as described by Soulsby (1982).

Gastrointestinal parasite cysts or trophozoites of protozoa, after creating a smear on the slide and letting it air dry, the cryptosporidium cysts were stained with a modified Ziehl-Neelsen and seen via an oil immersion objective [19].

Results and discussion

The examination period included the whole grazing season. The manure samples under examination included mostly *Moniezia* spp., eggs. 80 samples contained *Trichostongyliode* spp eggs, 51 samples *Parascaris equorum,* and 29 samples eggs of tapeworms from the genus *Anoplocephala*. Within the herd of horses from individual

farms, 189 (63%) were free from helminthic eggs. Respectively 39.9% of mares, 30% of geldings, and 22.5% of stallions were infected with gastrointestinal helminthic.

The majority of horses, regardless of age or sex, had *Moniezia* spp infections. In the manure of 1 gelding eggs of *Parascaris equorum* were found in addition to Anoplocephala spp., and *Trichostongyliode* spp. In individual farms. Coinfection of *Trichostongyliode* spp. and *Parascaris eqorum* were detected in two stallions.

In individual farms, mares were more infected with gastrointestinal helminthic, *Moniezia* spp. (39.9%), *Trichostongyliode* spp.(24%), *Parascaris equorum* (16%), and *Anoplocephala* spp.(8%) respectively. Horses in racing farms were more than 80.6% free of helminthic infection. Individual animals were infected with *Parascaris equorum* (40 mares, one stallion, and one gelding), in racing farms one young stallion was infected with Anoplocephala spp and 8 mares all shown in Table 1.

Table 1. Findings from the microscopic examination of gastrointestinal helminthic-infected horses from both individual and racing farms.

	group	No. infected/prevalence (%)					
		No. examined	Infected with gastrointestinal helminthic				Free of infection
			Moniezia spp.	*Trichostongyliode* spp.	*Parascaris equorum*	*Anoplocephala* spp.	
			Cestoda	Nematoda	Nematoda	Cestoda	
Individual farms	mares	250	99(39.9%)	60(24%)	40(16%)	20(8%)	151(60%)
	geldings	10	3(30%)	1(10%)	1(10%)	1(10%)	7(70%)
	stallions	40	9(22.5%)	2(5%)	1(2.5%)	0	31(77.5%)
	total	300	111(37%)	63(21%)	42(14%)	21(7%)	189(63%)
Racing farms	mares	130	22(16.9%)	13(10%)	9(6.9%)	8(6.1%)	108(83%)
	geldings	5	1(20%)	1(20%)	0	0	4(80%)
	stallions	15	6(40%)	3(20%)	0	1(6.6%)	9(60%)
	total	150	29(19.3%)	17(11.3%)	9(6%)	9(6%)	121(80.6%)

The examined fecal samples contained protozoan species from individual and racing farms showed in Table 2.

Table 2. Results of microscopic examination of horses infected with protozoan species from individual and racing farms.

	group	No. infected/prevalence (%)				
		No. examined	Infected with protozoan species			Free of infection
			Cryptosporidium parvum	*Blantidum coli*	*Entamoeba coli*	*Eimeria Spp.*	
Individual farms	mares	250	123(49.2%)	112(44.8%)	96(38.4%)	34(13.6%)	127(50.8%)
	geldings	10	6(60%)	5(50%)	1(10%)	1(10%)	4(40%)
	stallions	40	14(35%)	4(10%)	2(5%)	0	26(65%)
	total	300	143(47.6%)	121(40.3%)	99(33%)	35(11.6%)	157(52.3%)
Racing farms	mares	130	26(20%)	5(3.8%)	3(2.3%)	1(0.7%)	104(80%)
	geldings	5	1(20%)	1(20%)	0	0	4(80%)
	stallions	15	4(26.6%)	2(13.3%)	0	0	11(73.3%)
	total	150	31(20.6%)	8(5.3%)	3(2%)	1(0.6%)	119(79.3%)

The majority of horses, regardless of age or sex, had *Cryptosporidium parvum* infections.

Comparing feces samples from horses on individual farms and racing farms showed the total of infection from individual farms were infected with protozoa, *Cryptosporidium parvum* (47.6%), *Blantidum coli* (40.3%), *Entamoeba coli* (33%), *and Eimeria* spp.,(11.6%) respectively. While in racing farms the infection with protozoa was *Cryptosporidium parvum* (20.6%), *Blantidum coli* (5.3%), *Entamoeba coli* (2%), *and Eimeria* spp.,(0.6%) respectively.

The total Free infection samples with protozoa from the individual farms was (52.3%), while from racing farms was (79.3%).

Stallions from individual farms were infected with protozoa *Cryptosporidium parvum* (35%), *Blantidum coli* (10%), and *Entamoeba coli* (5%) respectively, while in stallions from racing farms, the infection was *Cryptosporidium parvum* (26.6%), and *Blantidum coli* (13.3%) respectively.

There was no infection with *Entamoeba coli,* in stallions and geldings from racing farms, and no infection in stallions from individual farms.

Due to differing management, mares and geldings were far more likely than stallions to have parasite infections on both individual and racing farms. Individual stallions were housed apart from the other animals in the herd. Mares, geldings, and stallions had a higher incidence of parasite infection on individual farms, but the level was lower in racing farms.

The results were affected by the continuously increasing number of infectious larvae on the grassland and the concurrent anthelmintic treatment of some horses, as fecal samples were collected during the whole grazing season.

Almost all grazing animals are susceptible to intestinal parasitism, which is most prevalent in horses. Horses are infected from the start of the pasture time by invasive larvae that survive the winter there. Despite having parasite infections and shedding a lot of eggs that contaminate pastures, many horses maintain their clinical health.

Animals grazing at limited pasture sections, especially those not cleansed from waste, are particularly prone to parasite infection. The amount of invasive larvae affects the rate of parasites spread during the grazing season, and the length or shortness of the pre-patent period affects parasite control.

The frequency of parasitism varies with the age and even sex of the animals under study, and several authors have brought attention to this issue in horses housed in different housing systems.

This study included several horses from two different types of horse farms (racing farms and individual farms). According to the findings, female horses on individual farms had a higher number of infections than geldings or stallions.

Infection with parasites of the type *Moniezia* spp., *Trichostongyliode* spp., *Parascaris equorum*., *Anoplocephala* spp. is consistent with a previous study from the western region of Libya [20].

The infection with protozoa was *Cryptosporidium parvum, Blantidum coli, Entamoeba coli, and Eimeria* spp. which showed similarity with a previous study from Misrata, Libya [21].

Infection with *Parascaris* spp., eggs in horses from individual farms showed similarity to a previous study from Italy, but infection on racing farms showed a significant difference from this study [22].

A significant 98.5–100% percentage of *Moniezia* spp., in the population of all *Anoplocephala* ssp., was discovered in the study of horses' feces by Mohamed and others [20].

In a previous study, the horses from studs, stallions studs, and riding clubs had twice-yearly deworming before and during the grazing season [23].

Cryptosporidium parvum was shown to be the most common infection in horses, with *Entamoeba coli* and *Eimeria* spp., being less common.

Stallions had a much lower prevalence of parasite infection than mares from the studs, likely due to a distinct maintenance approach, which is similar to our findings.

Stallions given green fodder in stables or maintained on separate pastures had the lowest amount of parasite eggs expelled, whereas horses housed in alcove stalls and using ground paddocks had the highest quantity.

Only horses from individual farms were found to have tapeworm and *Parascaris* infestations. Szelągiewicz et al. [24], who looked at horses used for both leisure riding and child treatment, found similar outcomes. The gastrointestinal parasites that infected 76.6% of the animals were *Parascaris equorum*, with the remaining 96.6% belonging to the Strongylidae family.

Due to their sensitivity to commonly used anthelmintics, which causes partial eradication from the local environment, large strongyles may have had a low participation rate in the examined horse populations.

Deworming procedures are not given more consideration by many individual farmers than racing farms.

Compared to individual farmers, racing farms sometimes have fewer grazing grounds per horse. They are also required to provide horses with a range of food besides grass and to properly manage their property. The common incidence of parasites in horses from racing farms may be explained by this.

The variations in the results of microscopic examinations among racing farm geldings and mares are an interesting fact. Since both groups of horses are housed in similar environments and typically graze on the same pasture, it is challenging to explain why geldings were more likely than mares to have parasite infections.

Conclusion

In conclusion, poor management or husbandry techniques in the research region may be linked to the high parasite prevalence rate in individual farms in the current investigation. In contrast, the study showed that the incidence of intestinal parasites and protozoa in racehorse farms was lower than in individual farms. This was attributed to the greater attention that breeders pay to racehorses, good management, and a stricter and more effective parasite treatment regimen.

More studies from Libya are recommended to assess the infection with parasites in horses and to provide a clearer picture of the epidemiological parasitic situation in the equine family in Libya.

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