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Working donkeys' living characteristics associated with helminthes infections in wet season in Qubaish locality, Western Kurdufan State of Sudan

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Abstract:

***Background**: Cyathostomins comprise 50 helminth species, considered the most problematic equine endoparasites. Therefore, the objective of the present study was to assess the working donkeys' living characteristics associated with helminthes infections in wet season in Qubaish locality, Western Kurdufan State of Sudan. **Methodology**: This is a retrospective cross sectional study conducted in Western Sudan to assess the epidemiologic burden of parasitic infections among donkeys. The study included 31 infected working donkeys. **Results**: The great proportion of the infected animals were found infected with*

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Trichonema (Cyathostomins) followed by mixed infection, Strongylus, Dictyocaulus and Oxyuris, constituting 38.7%, 32.3%, 22.6%, 3.2%, and 3.2%, respectively. ***Conclusion:*** *Trichonema (Cyathostomins) and Strongylus infections were found to be highly prevalent in working donkeys of West Kurdufan State. The housing conditions, feeding system as well as, waste disposal systems should be amended to reduce the chance of parasitic infection.*

Key words: Donkeys, helminthes, Sudan, Qubaish, parasitic infections

INTRODUCTION

Cyathostomins comprise 50 helminth species, considered the most problematic equine endoparasites [1]. Helminthes that affect donkeys cause major problem that influence animal health as well as, has economic impact. All common helminth parasites that affect horses also infect donkeys, so animals that co-graze can act as a source of infection for either species. Of the gastrointestinal nematodes, those belonging to the Cyathostomins (small strongyle) group are the most problematic in donkeys. Most grazing animals are exposed to these parasites and some animals will be infected all of their lives. The lungworm, *Dictyocaulus arnfieldi*, is also problematical, particularly when donkeys co-graze with horses [2].

Gastrointestinal parasitism recognized as one of the most important difficulties for equids in developing countries [3]. Studies conducted in some developing countries estimate the prevalence of endoparasite infections at over 90 % in horses [4-6] and over 80 % in donkeys [7-9]. In most reports the frequently recognized parasites include: *Strongyle*, Cyathostomes, *Triodontophorus* species, *Strongyloides westeri*,

Parascaris equorum, *Dictyocaulus arnfieldi*, *Oxyuris equi*, *Gastrodiscus* and *Fasciola* species [10-12].

The donkey's survival advantages arise from both socioeconomic and biological factors. Socioeconomic factors include the maintenance of a low sustainable population of donkeys owing to their single-purpose role and their low social status. Also, because donkeys are not usually used as a meat animal and can provide a regular income as a working animal, they are not slaughtered in response to drought, as are cattle. Donkeys have a range of physiological and behavioral adaptations that individually provide small survival advantages over cattle but collectively may make a large difference to whether or not they survive drought. Donkeys have lower maintenance costs as a result of their size and spend less energy while foraging for food; lower energy costs result in a lower dry matter intake (DMI) requirement. In donkeys, low-quality diets are digested almost as efficiently as in ruminants and, because of a highly selective feeding strategy, the quality of diet obtained by donkeys in a given pasture is higher than that obtained by cattle. Lower energy costs of walking, longer foraging times per day and ability to tolerate thirst may allow donkeys to access more remote, under-utilized sources of forage that are inaccessible to cattle on rangeland. As donkeys become a more popular choice of working animal for farmers, specific management practices need to be devised that allow donkeys to fully maximize their natural survival advantages [13].

Although the use of donkeys is considered as backwardness, yet in Sudan the use of donkey as a means of transport is common, particularly in remote states. In Sudan, the donkey population was estimated at 7.5 million in 2009 [14].

Therefore, the objective of the present study was to assess the working donkeys' living characteristics associated

with helminthes infections in wet season in Qubaish locality, Western Kurdufan State of Sudan.

MATERIALS AND METHODS

This is a retrospective cross sectional study conducted in Western Sudan mainly in Western part of the state of Western Kurdufan. The study included 31 infected working donkeys, they selected after examining 200 animals. A fecal sample was collected from each animal and immediately investigated by microscope for the presence of parasites. A purposeful questionnaire was used to obtain animal related demographical data from each animal's owner. Data obtained included: locality, animal age, animal sex, donkey type, body condition, Fecal consistency, Feeding type, Feeding method, Feeding habits & water, Housing, Bedding, Disposal of manure, Presence of helminth, Use of anti-helminthic, Response, Source of anti-helminthic, Presence of other infections, vegetation in wet season, Work intensity, Type of work, Donkeys users and the place where it used.

Sample collection and microscopic examination:

Faecal and blood samples were collected randomly during wet season from Qubaish locality, Western Kurdufan State of Sudan, for the diagnosis of *helminths* and evaluation the anaemic status in working donkeys of different sexes and ages.

Faecal samples collection and examination

Total of (200) fresh faecal samples (during wet) were collected randomly for the diagnosis of *helminths* in working donkeys of different sexes and ages. Fecal materials were taken directly from the rectum and placed in fecal sample containers (airtight containers) and labeled. The fecal samples were then transferred to the Parasitology Laboratory, Faculty of

Veterinary Medicine, West Kurdufan University. Feces were gross examined for morphological changes, odor and color. Modified McMaster slide technique was used to count egg per gram feces to assess the worm burden.

Techniques used for egg count and identification

Three grams of feces were taken from each collected fresh sample and mixed with 42 ml of fecal flotation solution Sodium Chloride (400 g NaCl in 1 litre H20 = specific gravity 1.2, then the fecal mixture was poured through tea strainer (sieve). The solution was removed from the strainer as much as possible by pressing on the material. The strained material was poured into a 15ml centrifuge tube and centrifuged at 1,500 rpm for 2 minutes. With a *pipette* or syringe, both of the chambers in the McMaster slide were loaded with the strained solution. The slide was allowed to sit for a few minutes for the flotation process. Then using a microscope the slides were red, focusing on the top layer so that the grid lines are in focus, the counts for each type of parasite egg were recorded in both chambers inside the gridlines (using the battlement method). After reading, the slide was washed thoroughly to be ready for the second use. The number of eggs per gram of feces was calculated as follows:

Each grid counts the eggs in 0.15 ml. So the total number of eggs counted was found in 0.3 ml. So, we used 3 g of feces, we convert this back to 45 ml because the original set up was 42 ml of solution + 3 g of feces = 45. Therefore, the number of eggs that found in the chambers was multiplied by 100. Then divided by 2 to convert the number into eggs per one gram of feces (Or just the number of eggs in the two chambers multiplied by 50).

Ethical consent:
The proposal of present study was approved by the Faculty Research Board Committee, Faculty of Veterinary Medicine, Sudan University for Science and Technology. Moreover, the sample obtained from each animal by none invasive method.

Data analysis:
Data were collected and arranged in standard master sheet then entered a computer software statistical package for social studies (SPSS) (SPSS version 16). Frequencies and Chi Squair test were obtained. P value less than 0.05 was considered as statistically significant.

RESULTS

The present study assessed the association between living characteristics of working donkeys and helminthes infections in wet season in Qubaish locality, Western Kurdufan State of Sudan. About 31 working donkeys of the screened animals were found infected with different helminthes. The great proportion of the infected animals were found infected with Trichonema (Cyathostomins) followed by mixed infection, *Strongylus, Dictyocaulus* and *Oxyuris,* constituting 38.7%, 32.3%, 22.6%, 3.2%, and 3.2%, respectively as shown in Table 1.

With regard to the distribution of the study subjects by housing conditions and parasite type, most infections were found among animals with Zariba housing representing 28/31(90%) followed tethered constituting 3/31(10%). Out of the 28 infected animals in Zariba housing conditions, 12/28(43%) were infected with Cyathostomes, 9/28(32%) with mixed parasites, 5/28(18%) with *Strongylus*, 1/28(3.5%) with *Dictyocaulus* and 1/28(3.5%) with *Oxyuris*. For the 3 cases of the tethered housing conditions, 2/3(66.7%) were found with

Strongylus and the remaining 1/3(33.3%) was detected with mixed infection, as indicated in Table 1, Fig 1.

With regard to the bedding, around 30/31(97%) of the infected animals were found with sand bedding and only one 1/31(3%) was found with hay bedding as described in Table 1, Fig 1.

Table 1. Distribution of the study subjects by housing conditions and type of parasite

Variable	Category	*Strongylus*	mixed	*Trichonema*	*Dictyocaulus*	*Oxyuris*	Total
Housing type							
	Zariba	5	9	12	1	1	28
	Tethered	2	1	0	0	0	3
	Free	0	0	0	0	0	0
	Total	7	10	12	1	1	31
Bedding							
	Sand	7	10	11	1	1	30
	Hay or straw	0	0	1	0	0	1
	Total	7	10	12	1	1	31

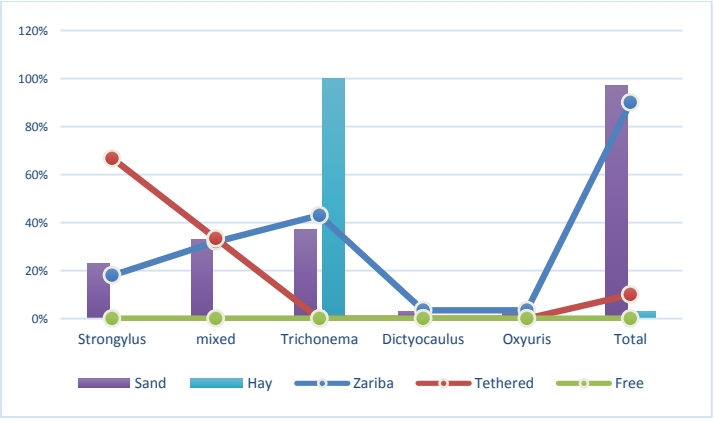

Figure 1. Description of the study subjects by housing conditions and type of parasite

Table 2, summarized the distribution of the study subjects by feeding conditions and type of parasite. The majority of the infected animals were found to feed with grass representing 27/31(87%) followed by supplementation constituting 4/31(13%).

Out of the 27 grass-feeding animals, 10/27(37%), 9/27(33%), and 6/27(22%) were found with *Cyathostomes,* mixed and *Strongylus,* respectively. Out of the 4 supplementation-feeding animals, 2/4(50%), 1/4(25%), and 1/4(25%) were found with *Cyathostomes,* mixed and *Strongylus,* respectively, as shown in Table 2, Fig 2.

For feeding method, 29/31 (93.5%) of the infected animals were found with single feeding method and the remaining 2/31(6.5%) were found to be feed in group, as indicated in Table 2.

For feeding habits, 28/31 (90%) of the infected animals were found to be feed indoor and the remaining 3/31(10%) were found to be feed in outdoor, as indicated in Table 2.

Table 2. Distribution of the study subjects by feeding conditions and type of parasite

Variable	Category	*Strongylus*	mixed	*Trichonema*	*Dictyocaulus*	*Oxyuris*	Total
Feeding type							
	Grass	6	9	10	1	1	27
	Supplementation	1	1	2	0	0	4
	Total	7	10	12	1	1	31
Feeding method							
	single	7	10	10	1	1	29
	group	0	0	2	0	0	2
	Total	7	10	12	1	1	31
Feeding habits							
	Indoor	6	10	10	1	1	28
	Outdoor	1	0	2	0	0	3
	Total	7	10	12	1	1	31

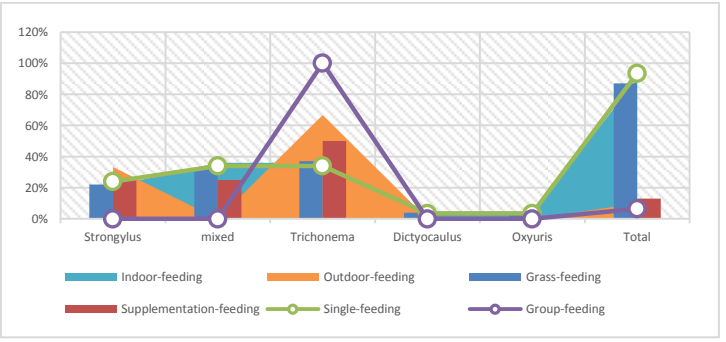

Figure 2. Description of the study subjects by feeding conditions and type of parasite

Table 3 summarized the distribution of the animals by disposal conditions and type of parasite. Disposal Manure was displayed in 30/31(97%) of the working donkeys with parasitic infections. The highest disposal frequency was weekly disposal constituted 27/31(87%), as indicated in Table 3, Fig 3.

With regard to the fecal consistency, the great majority of animals were found with normal fecal consistency representing 29/31(93.5%), as shown in Table 3, Fig 3.

Table 3. Distribution of the study subjects by disposal conditions and type of parasite

Variable	Category	*Strongylus*	mixed	*Trichonema*	*Dictyocaulus*	*Oxyuris*	Total
Disposal Manure							
	Yes	7	9	12	1	1	30
	No	0	1	0	0	0	1
	Total	7	10	12	1	1	31
Disposal Frequency							
	Monthly	0	0	1	0	0	1
	Weekly	7	9	10	0	1	27
	Other	0	1	1	1	0	3
	Total	7	10	12	1	1	31
Fecal consistency							
	Normal	7	10	11	1	0	29
	Soft	0	0	1	0	1	2
	Diarrhea	0	0	0	0	0	0
	Total	7	10	12	1	1	31

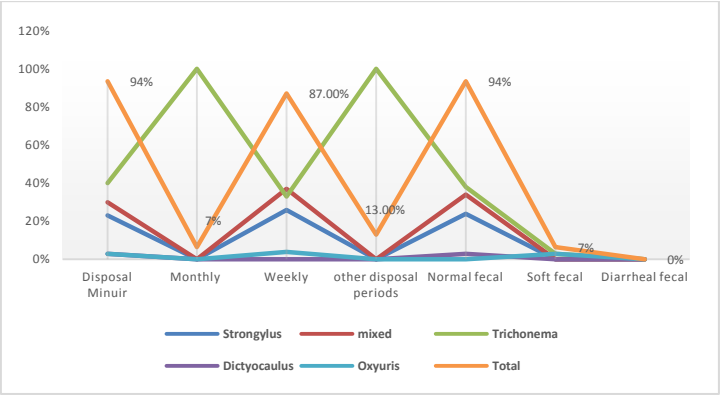

Figure 3. Description of the study subjects by disposal conditions and type of parasite

DISCUSSION

The objective of the present study was to describe the housing conditions and feeding practices in association with helminthes for working donkeys used by population of West Kurdufan state in central Sudan. Feeding strategies for the wet season are described, as well as the nutritional characteristics of the main forages and supplements used by the animals' owners. It was established that grazing on native grassland could afford sufficient energy and protein for donkeys at maintenance level and for those performing only a moderate amount of work [15]. But for those with heavy work they may require collection of food which might increase the risk of infection.

In the present study the highest percentage of the infected animals were found infected with *Cyathostomes* followed by mixed infection*, Strongylus, Dictyocaulus* and *Oxyuris,* constituting 38.7%, 32.3%, 22.6%, 3.2%, and 3.2%, respectively. However, relatively similar findings have been reported from some neighboring countries. In a comprehensive study involved 2935 working donkeys from Ethiopia, coprological examination revealed 99% strongyle, 80% Fasciola, 51% Parascaris, 30% Gastrodiscus, 11% Strongyloides westeri, 8% cestodes and 2% Oxyuris equi infection prevalence. Over 55% of donkeys had more than 1000 eggs per gram of faeces (epg). Forty two different species of parasites consisting of 33 nematodes, 3 trematodes, 3 cestodes and 3 arthropod larvae were identified from postmortem examined donkeys. Among the nematodes 17 species of Cyathostominae and 7 species of Strongylinae were identified. Other parasites identified include, Habronema muscae, Draschia megastoma, Trichostrongylus axei, Strongyloides westeri, Anoplocephala perfoliata, Anoplocephala magna, Anoplocephaloides (Paranoplocephala) mamillana, Parascaris equorum, Fasciola hepatica, Fasciola gigantica, Gastrodiscus aegyptiacus, Dictyocaulus arnfieldi,

Oxyuris equi, Probstmayria vivipara, Gasterophilus intestinalis, Gasterophilus nasalis, Rhinoestrus uzbekistanicus and Setaria equine [16].

In the current study the majority of the infected animals were kept inside Zariba (closed shelter for keeping animals from going free in Sudan). Zariba may increase the risk of animal autoinfection and auto contamination. Also Almost all animals were found with sand bedding, which might be another risk factor due to difficulties in cleaning and may act as suitable environment for development of infective stage (L3).

For feeding type, most animals feed grass and only limited number were found to be given supplementation feeding. In study investigate the helminth status of working donkeys under different management systems, Donkey owners in three different areas (one rural and two semi-rural) of the Moretele 1 district of North-West Province, South Africa, were visited and structured interviews were used to assess the management systems under which the donkeys were kept. Faecal samples were collected from 93 donkeys in the study once a month for 14 months. Faecal samples were analyzed for nematode and trematode eggs and cultured to produce third-stage larvae for the identification of the nematode species. Final comparisons between management system subgroups, as well as between areas, age groups and sexes were made. Four management systems were identified. (1) The first system identified consisted of donkeys which were kept in a small yard at all times. They were fed hay but no supplementary food. (2) The second system consisted of donkeys which were allowed to roam freely around the village most of the time and rounded up and held in an enclosure when needed for work. (3) The third system was identical to the second management system except that the donkeys were given supplementary food during winter. (4) The fourth system was only found in the one area where each owner owned 10 ha of land and here the donkeys were

allowed to roam freely on the owner's land and brought into enclosures prior to working. Helminth species composition and fecal egg count numbers differed between these four systems. The main difference noted was that donkeys from management system one showed significantly higher numbers of strongyle eggs and higher percentages of some of the strongyle larvae. Management system two had a higher Strongyloides mean egg count and prevalence than the other areas. Parascaris and Gastrodiscus egg counts differed between all four systems. Since the results showed differences in the number and species of helminths in donkeys kept under the four management systems, suggestions are made as to which management system would facilitate reduction of helminth parasites in the animals. Although supplementary feeding in Moretele 1 is fairly rare, it would seem that donkeys which do have access to better food resources have lower egg counts than donkeys on limited grazing [17].

The present study showed that the frequency disposal manure was weekly for the majority of the infected animals. Donkey waste, like all waste from livestock, is safe for use as manure for crops, including vegetables so long as it has been allowed to compost adequately. However, it might be a source of parasitic infection particularly if the animal is infected. Therefore, cleaning using disinfection or decontamination was suitable for better prevention. However, this will be difficult if the bedding is sand and the disposal is extended for complete week.

In conclusion: *Cyathostomes* and *Strongylus* infections were found to be highly prevalent in working donkeys of West Kurdufan State. The housing conditions, feeding system as well as, waste disposal systems should be amended to reduce the chance of parasitic infection. Preventive strategies are deemed important to shelter the health and economic positive impact of

these animals. Awareness creation among the community concerning the equine welfare, especially the health condition of equines is necessary. Further studies are required to highlight the human's animal interrelation in term of zoonotic infection.

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REFERENCES

1-Stratford CH, Lester HE, Pickles KJ, McGorum BC, Matthews JB. An investigation of anthelmintic efficacy against strongyles on equine yards in Scotland. Equine Vet J 2014; 46: 17–24. doi:10.1111/evj.12079

2-Matthews JB, and Burden FA. Common helminth infections of donkeys and their control in temperate regions. Equine Veterinary Education 2013; 25: 461–467. doi:10.1111/eve.12018.

3-Pereira JR, Vianna SS. Gastrointestinal parasitic worms in equines in the Paraíba Valley, State of São Paulo, Brazil.Vet Parasitol. 2006 Sep 10; 140(3-4):289-95.

4-Gebreab F (1998) Helminth parasites of working equids, The African perspective. In: proceedings of the 8th international Conference on Infectious disease of Equines, Dubai, UAF. pp. 318–324

5-Fikru R, Reta D, Bizunesh M. Prevalence of equine gastrointestinal parasites in western high lands of Oromia, Ethiopia. Bull Anim health prod Afr. 2005;53:161–166.

6-Valdez-Cruz MP, Hernandez-Gil M, Galindo-Rodriguez L, Alonso-Diza MA (2006) Gastrointestinal parasites burden body condition and hematological value in equines in the humid tropical area of Mexico. In: A. person, C. Muir and M, Farrow (eds) Proceedings of the 5th International colloquium on working equines. The Future for working equines. The donkey sanctuary Sidmouth, pp. 62–72.

7-du Toit N, Burden FA, Dixon PM. Clinical dental findings in 203 working donkeys in Mexico. Vet J. 2008 Dec; 178(3):380-6.

8-Getachew M, Trawford A, Feseha G, Reid SW. Gastrointestinal parasites of working donkeys of Ethiopia. Trop Anim Health Prod. 2010 Jan; 42(1):27-33.

9-Burden FA, Du Toit N, Hernandez-Gil M, Prado-Ortiz O, Trawford AF. Selected health and management issues facing working donkeys presented for veterinary treatment in rural Mexico: some possible risk factors and potential intervention strategies. Trop Anim Health Prod. 2010 Apr; 42(4):597-605.

10- oseph S, Feseha G, Abebe W. Survey on helminthosis of equines in wonchi. J Ethiop Vet Assoc. 2001;5:47–61.

11-Dersema G. Epidemiological study of helminthosis in traction horses in three selected districts of the Awi zone, North West Ethiopia. Ethiop Vet J. 2006;10(2):37–54.

12-Sheferaw D, Alemu M. Epidemiological study of gastrointestinal helminths of equines in Damot-Gale district, Wolaita zone, Ethiopia. Journal of Parasitic Diseases: Official Organ of the Indian Society for Parasitology. 2015;39(2):315-320.

13-Smith DG, Pearson RA. A review of the factors affecting the survival of donkeys in semi-arid regions of sub-Saharan Africa. Trop Anim Health Prod. 2005 Nov;37 Suppl 1:1-19. doi:10.1007/s12639-013-0352-z.

14-Ministry of Animal Resources (MARF and Fisheries, Annual Report (2009).

15-Colunga GB, Arriaga-Jordán CM, Veláquez Beltran L, et al. Participatory study on feeding strategies for working donkeys used by Campesino farmers in the highlands of central Mexico. Trop Anim Health Prod. 2005 Nov; 37 Suppl 1:143-57.

16-Getachew M1, Trawford A, Feseha G, Reid SW. Gastrointestinal parasites of working donkeys of Ethiopia. Trop Anim Health Prod. 2010 Jan;42(1):27-33. doi: 10.1007/s11250-009-9381-0.

17-Wells D, Krecek RC, Wells M, Guthrie AJ, Lourens JC. Helminth levels of working donkeys kept under different management systems in the Moretele 1 district of the North-West Province, South Africa. Vet Parasitol. 1998 Jun 15; 77(2-3):163-77.