



Field Survey on Infestation of Iraqi Camels with Small Intestine Worms in Al-Qadisiyah Governorate

Zahra M. Al-Hakak

AL-Furat AL-Awsat Technical University, Technical Institute of Karbala, Iraq
E-mail: zahra.make@yahoo.com

Abstract: Camels are of great importance in all countries of the world and Arab countries, including Iraq. Therefore, conducted this study in Al-Qadisiyah governorate on camels that were brought to slaughter in the governorate's slaughterhouse include examination on 192 camels before slaughter and collected samples of their faeces. After slaughter, the small intestine was taken for laboratory examinations. The study was conducted for the period from August 1, 2019 to August 31, 2020. There were 105 animals infected with parasites of the small intestine of males (43) and females (62). The highest infection was recorded in November which is the mild weather (1320 worms), while was 11 during August. The highest rate of parasite eggs was during the spring and autumn. The types of worms were recorded were *Moniezia expansa* and *Avitellina* spp. *Camelostrongylus mentullatus*, *Nematodirus helvitainus*, *Nematodirus spathiger*, *Nematodirus* spp., *Trichostrongylus* spp. The study recommends conducting studies on internal and external parasites of camels and to establish farms for breeding camels in Iraq to benefit from their meat and milk.

Keywords: Field survey, Small intestine, Infected, Worms, Al-Qadisiyah Governorate, Iraqi camels

Camels play a major role in the lifestyle of many societies, especially those in semi-arid and arid regions in the Middle East and Arab regions (Al-Ani Falah Khalil 2010, Robert Irwin 2012). The Arabian camel has one a huge hump lives in the Arab world, Africa and the Indian subcontinent. As for the two-humped camel, it is endemic to Central Asia, where the winters are cold, as it is covered with a winter coat to protect it from the cold of winter, and its legs are short while the Arabian camel's legs are long to keep it away from the heat of the sand as much as possible (Al-Ani Falah Khalil 2010, Robert Irwin 2012). The camel considered as a ruminant animal, so its digestive system consists of three parts (Hamid Ali 2019) the rumen is the first part, where its contents occupy about 10-15% of the weight of the animal; in the lower part of the rumen there are pockets whose openings are surrounded by strong muscles (Bradford 2002). Retina is the second part which is similar to that of other ruminants, except that its inner surface contains glandular bags that store about 2 liters of water. (Bradford 2002, Radostitis et al 2002). The third part (the tube room) corresponds to the convolution which the real stomach in other ruminants where the boundary between them disappears from the outside, and from the inside there are no leaves and replaced by folds with the spread of tubular-shaped glands that distinguish the leaf from the real stomach (Hamid Ali 2019). The length of the small intestine in camels is 40 m while the large intestine 19.5 m with a cecum. The spleen is curved and scarlet in color. The camels do not have a gallbladder vesicle. (Bradford 2002, Radostitis et al

2002). Although camels live in desert and environmental conditions that are not suitable for the reproduction and transmission of parasites (Radostitis et al 2002, Wernery and Kaaden 2002). There are no adequate studies in Iraq on the extent of camels' disease in general and their gastrointestinal diseases in particular. The current study is find out whether camels are generally infected with small intestine parasites, their types, infection in Qadisiyah Governorate and whether any effect of months, gender and age on infection.

MATERIAL AND METHODS

192 samples were collected from the complete digestive tracts. Then taking a part of the small intestine and samples of the faeces from camels that were slaughtered in AL-Qadisiyah governorate massacre from August 1, 2019 to August 31, 2020. The samples collected weekly with two visits per week. The ages of camels ranged between 1-18 years. The samples were divided into ten groups based on the age and gender of the animals (Table 1).

Clinical examination: Before slaughter-ing and collecting samples, the animals examined clinically for temperature, speed of pulse and respiration, skin and skin covering, lint shine, to note the integrity of the skin and the absence of external parasites. The animal is examined clinically after one of its front limbs are tied in order to sit and its head is tied to the side far from the examiner, often with the animal's back leg. Then the mucous membranes of the conjunctiva of the

eye are examined, temperature, pulse rate and breathing are measured.

Collecting contents of the small intestine: The contents of the small intestine are emptied by opening it along its length and washing it well, then its contents are passed through a filter 90 mesh / inch and the contents are diluted to 4 liters, then a sample of 400 cm³ is taken and placed in glass bottles after adding 10 cm³ of formalin at a concentration of 10% until use.

Detection of eggs and counting their number in faeces: Faeces samples from the rectum were collected directly to calculate the number of eggs by McMaster method (Gordon and Whitlock 1939). By mixing well 3 grams of faeces with 42 cm³ of water, then it is passed through a filter 60 mesh / inch. After that, a sample of the filtrate is taken with a volume of 15 cm³ and placed in a clean test tube to be placed in a centrifuge 1500 cycle for two minutes, then the filtrate is poured to take the precipitate and mixed with a saturated solution of sodium chloride to reach the volume to 15 cm³. The tube is flipped several times to complete the process of good mixing, then fill in one of the two corridors of the modified McMaster by a Pasteur pipette with a size of 0.15 mm³ to calculate the number of eggs and multiply the number of calculated eggs in (100) to obtain the number of eggs per gram.

Number of worms and their diagnosis: The contents of the small intestine were taken and placed in a glass dish and

examined under an anatomical microscope in order to isolate the worms and calculate their numbers. Added one drop of lactophenol to clarify its parts and examine them under a compound microscope. It was adopted in the diagnosis of the species on males' description of (Dunn & Dunn 1978, Murray Levine 1982, Soulsby 1982).

To obtain the number of small intestinal worms, the number was multiplied by the dilution factor 10. The tapeworms, after isolating them from the contents of the small intestine, they were left in water for 1-7 hours were fixed in formal-saline for 24 hours after cutting them into small pieces and the head of the worm, small pieces of it were placed between two glass slices and the carmine dye was used (Carleton 1980), then it was examined under a compound microscope.

Statistical analysis: SPSS statistical analysis for windows operating system (version 16) (IBM SPSS Bootstrapping 24, 2016) was used.

RESULTS AND DISCUSSION

After examining 192 samples of intestinal contents with the same number of faeces samples of camels that were slaughtered in the massacre in AL-Qadisiyah governorate for both sexes, here are 105 animals of camels infected with small intestine parasites, 54.7% and the number of healthy camels were 45.3%. The number of infected camels of males was 22.4% the number of females 32.3%, (Table 2). The percentage of 54.7% maybe high, but this does not mean that camels are sick, as the severity of the symptoms resulting from infection with intestinal worms depends on several factors, including the type of parasite, its number, the host's race and his way of life. The high percentage of infection may be attributed to not treating these animals with dewormers drugs and the higher rate of infection in females than males is that the slaughter of males at young ages higher because use females for reproduction, pregnancy and childbirth, which leads to a high rate of female infection (Swai et al 2011). The clinical examination of infected animals in characterized by an increase in respiratory and pulse rate, a rise in temperature, animals lethargy, loss of appetite, general weakness, roughness and lack of luster of lint (Table 3) which is similar to earlier observations (Radostitis et al 2002, Moallin 2009).

Table 1. Total numbers and the groups of the camels according to the age and sex

Sex	Age / Year	Total number	Percent
She camel	1 – 3	10	5.20
Camel	1 – 3	30	15.62
She camel	4 – 7	26	13.54
Camel	4 – 7	25	10.02
She camel	8 – 11	15	7.81
Camel	8 – 11	18	9.37
She camel	12 – 15	13	6.77
Camel	12 – 15	12	6.25
She camel	16 – 18	32	16.66
Camel	16 – 18	11	5.72
Total		192	100

Table 2. Total numbers of healthy and infected camels with small intestinal worms for both sexes

Sex	Infected camels	%	Healthy camel	%	Total number	%
She camel	62	32.3	34	17.7	96	50
Camel	43	22.4	53	27.6	96	50
Total	105	54.68	87	45.3	192	100

The highest rate of worms was in the November (59.48 %) followed by in June (10.36%) While the lowest rate of worms recorded during August (0.49%) consistent with earlier study (Mohammed et al 2007, Nwosu et al 2007, Magzoub M 2000).

The species of worms in small intestine were *Cooperia* spp. , *Moniezia expansa*, *Avitellina* spp., *Camelostrongylus mentullatus*, *Nematodirus helvitainus*, *Nematodirus spathiger*, *Nematodirus* spp., *Trichostrongylus* spp. *Trichostrongylus colubriformis*, *Trichostrongylus probolarus*. These species were recorded by (Soulsby 1982, Radfar and Gowhari 2013.) The highest infection was by *Nematodirus helvitainus* (49.47 %). The lowest species recorded was *Moniezia expansa* (1.04%). The results of the examination of the eggs in faeces showed that the highest rate of eggs laid / gram of faeces per animal was during the spring and early summer season. The highest rate was 2450 during June, and the followed by April about 2100. The September and October also recorded high egg laid, (1000 and 1120), while the lowest average was during August and July (550 and 600) (Table 6). This indicates that in spring the number of eggs released was proportional to the number of worms present in the intestines of camels.

In desert areas, the number of eggs increases in order to reach the precipitated larvae and restore their effectiveness again during the spring. This was also observed by Dirie F & Abdurahman (2003). The increase in the numbers of eggs during the autumn months may be due to the increase in egg shedding by the huge number of worms present in the camels, which leads to pollution of the environment and the existence of appropriate conditions of appropriate temperature and humidity, so the number of infectious larvae increases and the possibility of increasing infection with camels, which is consistent with Ukashatu et al (2012) and Wafa (2015). The Figures 7, 8 shows the shape of the eggs of

Table 4. Infection of camels with small intestine worms during the month of the year (Per cent)

Months	Mean of intestinal worms / month	Mean±	SE
January	45	2.02±	8.1
February	33	1.48	12.6
March	30	1.35	8
April	230	10.36	42.9
May	85	3.83	21.7
June	55	2.47	17.8
July	1320	59.48	268
August	11	0.49	6.5
September	92	4.14	37.2
October	218	9.82	24.5
November	22	0.99	6.8
December	78	3.51	28.9
Total	2219	100	19.39

Table 5. Species of parasite in intestine in Iraqi camels

Species of parasite	Number of worms	Number of infected animals	Percent
<i>Trichostrongylus</i> spp	45	32	23.43
<i>Trichostrongylus colubriformis</i>	22	15	11.45
<i>Trichostrongylus probolarus</i>	2544	135	1.32
<i>Nematodirus</i> spp	38	23	19.79
<i>Nematodirus helvitainus</i>	95	38	49.47
<i>Nematodirus spathiger</i>	83	32	43.22
<i>Camelostrongylus mentullatus</i>	11	1	5.72
<i>Avitellina</i> spp	7	5	3.64
<i>Moniezia expansa</i>	2	2	1.04
<i>Cooperia</i> spp	9	6	4.68

Table 3. Clinical examination of infected camels for both sexes

Sex	Age / Year	Total number	%	Infected camels	%	Tem.C	Pulse /min.	Res. /min.
She camel	1-3	10	5.20	6	3.125	37.78	52.75	17
Camel	1-3	30	15.62	14	7.29	37.05	47.97	16.79
She camel	4-7	26	13.54	16	8.33	36.52	49.25	17
Camel	4-7	25	10.02	13	6.77	38	52.55	15.7
She camel	8-11	15	7.812	6	3.125	37.85	44.72	11.8
Camel	8-11	18	9.37	8	4.166	36.98	49.09	12.98
She camel	12-15	13	6.77	6	3.125	37.12	47.18	13.81
Camel	12-15	12	6.25	8	4.166	36.8	45.93	13.64
She camel	16-18	32	16.66	23	11.97	37.3	64.42	14.5
Camel	16-18	11	5.729	5	2.60	37.1	51.65	14.95



Fig. 1. Shows in front of *Trichostrongylus* spp. (X100)

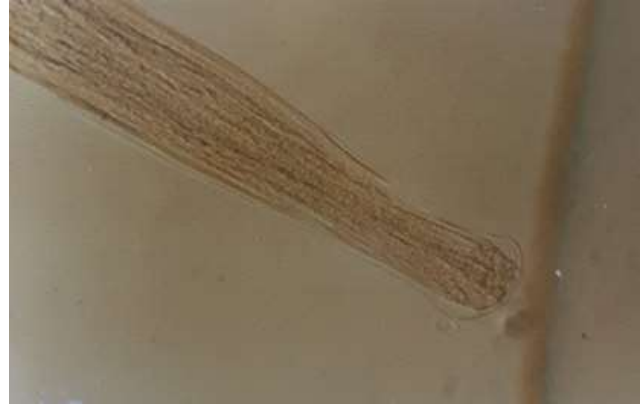


Fig. 5. Shows the in front of *Nematodirus* spp. (X200)



Fig. 2. Shows the back of the parasite *Trichostrongylus* spp. (X200)



Fig. 6. Shows the back of the female *Nematodirus* spp. (X40)



Fig. 3. Shows in front of *Moniezia expansa* (X40)

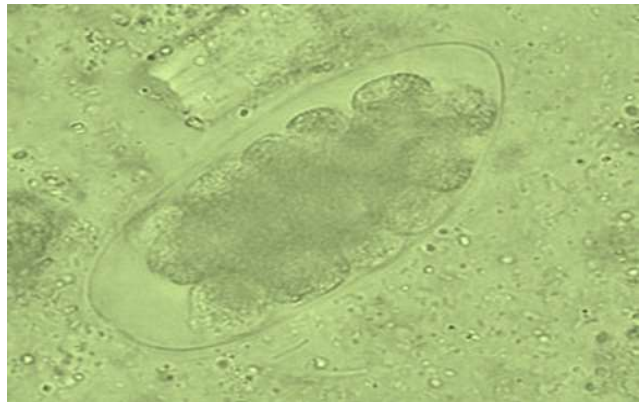


Fig. 7. Egg of *Trichostrongylus* spp. (X10)



Fig. 4. The mature pieces of *Avitellina* spp. (X40)



Fig. 8. Shows the egg of *Nematodirus* spp. (X10)

Table 6. Number of worm eggs excreted from the small intestine / gram of faeces during different month (Mean \pm SE)

Months	Highest number of eggs excreted /gram of faeces/ animal	Rate of eggs excreted/ gram of faeces / animal	
January	800	650 \pm	45.22
February	1100	800	90.45
March	1800	1400	120.6
April	2700	2100	180.9
May	2000	1700	75.37
June	2800	2450	105.52
July	900	600	90.45
August	700	550	45.22
September	1200	1000	60.30
October	1350	1120	69.30
November	1000	845	46.73
December	1100	900	60.30

some small intestine worms for e diagnostic (AL-taif 1974). The highest rate of eggs laid per gram of faeces per animal was during the spring and early months of summer (2450 during June) (Table 6).

CONCLUSION

Camels are infected with internal parasites, like other ruminants, they show signs of disease and weakness in cases of severe parasitic infection and failure to give anthelmintic drugs, which negatively affects the production of meat, milk and lint for camels, especially females, which are kept for long ages for reproduction. Therefore, research is required to preserve this wealth animal by limiting the unjust slaughter of weak or infected animals also formation of mobile veterinary teams by developing a preventive program to give anthelmintic and fortifying medicines to compensate for nutritional deficiency and strengthen immunity to reduce infection with diseases and parasitic diseases in particular.

REFERENCES

- Abdul-Salam JM and MA Farah 1988. Seasonal fluctuations of gastrointestinal helminthes of camels in Kuwait. *Veterinary Parasitology* **28**: 93-102.
- Ahmed Abdel-Rady 2014. Epidemiological studies on parasitic infestations in camels (*Camelus dromedaries*) In Egypt. *European Journal of Environmental Ecology* **1**(1): 16-20.
- Al-Ani Falah Khalil 2010. *Encyclopedia of Camels / Their names, varieties, uses, breeding and diseases of the cultural book*.
- AL-taif KI 1974. *Helminthes in camel in Iraq. Tropical Animal Health and Production* **6**: 55-57.
- Armour J 1980. The epidemiology of helminthic disease in farm animals. *Veterinary Parasitology* **6**: 7-47.
- Bradford PS 2002. *Large animal internal medicine*, 3rded. Mosbey.
- Carleton HM 1980. *Histological technique*. Oxford; New York: Oxford University Press. 5th ed. / by Drury, R. A. B. (Roger Anderson Brown sword) Wallington, E. A.; (1973).
- Dirie MF and Abdurahman O 2003. Observations on little known diseases of camels (*Camelus dromedarius*) in the horn of Africa. *Revue Scientifique et Technique (International Office of Epizootics)* **22**(3): 1043-1044.
- Dunn A 1978. *Veterinary Helminthology* (2nd Ed.). William Heinemann Medical Books Ltd., London.
- Dunn R and Dunn K 1978. Teaching Students through Their Individual Learning Styles. Reston, VA: Reston.
- EL- Bihari S 1985. Helminthes of camels ((A review)) *British Veterinary Journal* **141**: 315.
- Gordon HMcl 1948. The epidemiology of parasitic diseases, with special reference to study with nematode parasites in sheep. *Australian Veterinary Journal* **24**: 17-45.
- Gordon H Mcl and Whitlock HV 1939. A new technique for counting nematode eggs in sheep faeces. *Journal of the Council for Scientific and Industrial Research* **12**(1): 50-52.
- Hamid Ali 2019. *Physiology and Anatomy of Camels*, Amjad Publishing House.
- Higgins AJ 1983. The camel in health and disease. *Veterinary Bulletin* **53**: 1089-1100.
- IBM SPSS Bootstrapping 24. IBM Corporation, North Castle Drive, Armonk, New York, USA. (2016).
- Magzoub M, Omer OH, Haroun EM and Mahmoud OM 2000. Effect of season on gastrointestinal nematode infection.
- Moallin ASM 2009. *Observations on diseases of the dromedary in Central Somalia*. November 5, 2009. p.23.
- Mohammed AK, Sackey AKB, Tekdek LB and Gefu JO 2007. Common health problems of the one humped camel (*Camelus dromedarius*) introduced into Sub-Humid climate in Zaria, Nigeria. *Research Journal of Animal Sciences* **1**: 1-5.
- Morgan DO and Sloan JEN 1974. Researches on helminthes in hill sheep with special references to seasonal variation in worm egg output. Cited by (Armour, 1980).
- Murray Levine 1982. Method or madness: On the alienation of the professional. Volume 10, Issue 1. pp: 3-14.
- Nwosu CO, Madu PP and Richards WS 2007. Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of North-Eastern Nigeria. *Veterinary Parasitology* **144**: 118-124.
- Radford MH and Gowhari MA 2013. Common gastrointestinal parasites of indigenous camels (*Camelus dromedarius*) with traditional husbandry management (free-ranging system) in central deserts of Iran. *Journal of Parasitic Diseases* **37**: 225-230.
- Radostitis OM, Gay CC, Blood DC and Hinchcliff KW 2002.

- Veterinary Medicine .10th ed., W.B. Saunders. PP:(55 60), (390 - 405), (705), (1032 - 1050), (1562-1714).
- Robert Irwin 2012. Camel (natural and cultural history). Publishing house: Abu Dhabi Authority for Culture and Heritage (Word Project).1st ed. pp.: 263.
- Schmidt-Nielsen K 1979. Desert Animals, Physiological Problems of Heat and Water. New York: Dover Publications Inc.
- Selim M K and Rahman M S 1972. Enteric nematodes of camels in Egypt,
- Sharrif LK Al-Qudah and Al-Ani FK 1996. Prevalence of gastrointestinal parasites in camels in Jordan. *Journal of Camel Practice and Research* 5: 1-4.
- Soulsby EJL 1982. *Helminthes, Arthropods & Protozoa of domesticated animals* 7th. ed. Balliere& Tindall, London, P.P:1 – 35.
- Swai ES, Moshy W, Mshanga D, Lutatina J and Bwanga S 2011. Intestinal parasitic infections of camels in the agro and pastoral areas of northern Tanzania. *Livestock Research for Rural Development* 23(5).
- Ukashatu S, Saulawa MA and Magaji AA 2012. Epidemiology of gastrointestinal parasites of one-humped camel (*Camelus dromedarius*) Slaughtered in Sokoto Central Abattoir, Sokoto State, Nigeria. *Scientific Journal of Veterinary Advances* 1: 105-109.
- Wafa AI and Al-Megrin 2015. Prevalence Rate of Intestinal Parasites in Camels in Riyadh, Saudi Arabia. *International Journal of Zoological Research* 11: 65-70.
- Wernery U and Kaaden O 2002. *Infectious diseases of Camelids*. 2nd Ed. Blackwell Science: P150-54.

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