

FIRST REPORT OF SHEEP BOTFLY *OESTRUS OVIS* (LINNAEUS) (DIPTERA: OESTRIDAE) FROM THE NASAL SINUS OF SLAUGHTERED GOAT IN THE REPUBLIC OF YEMEN

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ABSTRACT

Many dipteran larvae are myiasis causing agents. These larvae can invade human and animal tissue. Nasal myiasis is caused by the larvae of *Oestrus ovis* (Diptera: Oestridae). Livestock raising is a tradition passed through generations and is practiced by the rural people in Yemen, especially in villages for economic earnings by selling them or slaughtering them as a source of meat. In a village Al-Khanf, Aridat Shari at Same'a District, Taiz Governorate, goats, sheep, and cows were sacrificed on Eid Al-Adha in 2021. About 50 larvae were recovered from the nasal canals of four sacrificed goats, 10 of which were placed in containers containing 50 ml of surgical alcohol 70% and brought to the laboratory. The larvae were dissected under a microscope. Following the identification keys, the posterior spiracles were mounted under the light microscope. The larvae were identified as sheep botfly *O. ovis* larvae. This is the first report of existence of *O. ovis* in Yemen, since no previously reported evidence of this fly in Yemen.

Keywords: Nasal myiasis, *Oestrus ovis*, Sheep Botfly, Oestridae, Taiz City, Yemen

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INTRODUCTION

Myiasis, an infection that affects humans and animals, is caused by dipteran larvae. It can result from the larvae of many important dipteran families, such as Oestridae, Calliphoridae, Muscidae, and Sarcophagidae (Hasheminasab *et al.*, 2015; Pezzi *et al.*, 2019). Generally, myiasis involves interactions between flies and warm-blooded hosts (Masoodi and Hosseini, 2004). Myiasis can be categorized as facultative or obligatory. Myiasis can occur in facultative forms in which the larvae invest and feeds on necrotic tissues, but it can also occur in environmental conditions in which the fly can complete their life cycle also. Contrary to that, in obligatory myiasis, the infestation of viable tissue is necessary for the fly's lifecycle to be completed (Cheshier *et al.* 2007; Hoyer *et al.* 2016). *Oestrosis* is a myiasis infection caused by the larvae of the *O. ovis* fly (Diptera, Oestridae), which develops from first- to third-stage larvae inside the host. Small, green and grey, with short brown hairs and black dots on the thorax, *O. ovis* and its larvae are widely known for causing myiasis. The fly, *O. ovis* is widely distributed around the world via exportation of sheep, and it is especially prevalent in the tropics during the hot season. Therefore, Sheep and goats are considered obligate hosts for these parasites, which inhabit the nasal and sinus cavities (Hasheminasab *et al.*, 2015; Allaie *et al.*, 2016; Dawud and Aki, 2018).

Around the nostrils of sheep or goats, a female fly deposits young larvae. The larvae after hatching from eggs, on the anterior end armed with two hooks crawl up the nostrils feeding on the nasal mucosa and enter the sinuses where they grow. They move through the second stage of development after 1 to 10 months, and migrating to the frontal sinuses to mature, and finally they are sneezed out. The yellow white larvae, burrow into the soil after dropping to the ground. During 3-9 weeks, pupation takes place after which the young fly emerges (Dawud and Aki, 2018).

In almost every country around the globe from the earliest eras the incidence of *O. ovis* larvae in goats has attracted attention. However, across the scientific publications of many countries there has been extensive information on the problem existence (Ahaduzzaman, 2019). Considerably significant economic losses and less animal production lead due to pathogenic effects. Furthermore, Interference with feeding and rumination reduces weight gain and may reduce milk and wool production which has been roughly calculated as up to 22% in body weight, 16% in wool production and 10 % milk per animal (Ipek, 2018).

In the Republic of Yemen, no research work has carried out on the incidence of *O. ovis* larvae in animals. However, only three cases of ophthalmomyiasis were reported in humans

Due to its zoonotic importance and disease causing ability in goats and sheep (Ali *et al.*, 2006; Fasih *et al.*, 2014; Abbas and Amla, 2016), the study was conducted to warn of the presence of this fly in Yemen and call attention to the need to control it before it becomes a seasonal or sporadic pest.

MATERIALS AND METHODS

Larval Collection: In the village of Al-Khanf, Aridat Shari at Same'a District, Taiz Governorate, Yemen (coordinates [13°23'57.0"N 44°04'28.5"E]) (Figure 1, 2), many goats, sheep, and cows are always sacrificed at Eid Al-Adha. In free grazing situation and seemed completely healthy with no visible clinical signs except nasal discharge, the goats were one year old with about 30 kg weight. In 2021, larvae were seen in the nasal canals of four sacrificed goats. These goats were raised at different houses in the same village. None of them had been brought from another village. A total of about 50 larvae were seen in the sacrificed goats. Ten larvae were randomly collected and placed in a well-closed container containing 50 ml of Medical Spirit (ethanol 70%) and transferred to the Entomology laboratory at Department of Biological Science, Faculty of Science, University of Bisha- Saudi Arabia.

Larval Identification: The collected larvae were dissected under a stereo zoom microscope (AmScope SE306R-PZ-LED Forward-Mounted Binocular Stereo Microscope) and the photos were taken under the zoom microscope with Sony cyber shot digital camera 16 megapixel. Larvae were morphologically identified following taxonomic keys (Zumpt, 1965; Pape, 2001; Ahaduzzaman *et al.*, 2015; Kamal *et al.*, 2021) as third-instar *O. ovis*.

Taxonomic View Of Genus And Species

Genus *Oestrus* Linnaeus (1758)

- *Oestrus* Linnaeus, 1758: 584. Type species: *Oestrus ovis* Linnaeus, (1758), originally designated by Curtis, 1840: 106.
- *Cephalemyia* Latreille, 1818: 273. Type species: *Oestrus ovis* Linnaeus, (1758), monotype.
- *Cephalomyia* Agassiz, 1846: 71. Unjustified emendation of *Cephalemyia*.

Oestrus Ovis Linnaeus (1758)

- *Oestrus ovis* Linnaeus, 1758: 585. Type locality: Not given (In Sweden).
- *Oestrus argalis* Pallas, 1776: 29. Type locality: Not given (In Middle Asia).
- *Oestrus perplexus* Hudson, 1892: 63. Type locality: in New Zealand. *Nomen nudum*.

RESULTS AND DISCUSSION

O. ovis larvae cause nasal-sinusal myiasis in goats and sheep, known as oestrosis. This widely distributed disease badly affects the health of the infecting animal, causing breathing hard when the discharge from the nasal cavity becomes solidified with dust. It can cause acute clinical manifestations, which include breathing problems, anorexia, weakness, difficult snoring respiration and breathlessness (Dorchies *et al.*, 1992; Dorchies *et al.*, 1995). Furthermore, this disease can be complicated by sensual tumors and lung abscesses, and sometimes this infection leads to starvation, which might cause death (Özidal *et al.*, 2016). Occasionally, the larvae from frontal sinuses and nasal cavity may move into the brain leading to false gids (Patra *et al.*, 2018). Before the goats were sacrificed, some external signs of infection were noticed, such as the presence of much discharge from the nostrils. All four slaughtered goats showed the same symptoms, but no larvae were observed before the goats were slaughtered. The heads of the goats were opened to extract the brains for use in preparing a local recipe. When the larvae were observed inside the nasal canal and sinus cavities, larvae were collected, and the head of the goats were discarded. Photos of third-instar larvae are shown in Figure 2. After the larvae were dissected, posterior spiracles were mounted under the microscope. The D-shaped posterior spiracles were observed to have a central button without a distinct suture (Figure 3). This confirmed the larvae's identification as *O. ovis* with different studied confirmed by Widad, (2010) and Dawud and Aki, (2018).

The obtained result could be a warning sign of the presence of one of the most parasitoid flies in Yemen, which can cause a serious loss of livestock as well as myiasis in humans. The screening of this village and ones adjacent to it should be considered to control this fly before it becomes an epidemic pest.

Sheep botfly, or *O. ovis*, is cosmopolitan in distribution. It is a myiasis causing agent, and its larvae are obligatory parasites of sinus cavities and nasal canals in sheep and goats. This fly was first identified and described by Zumpt (1965). The larvae can also invade humans and causing respiratory and non-respiratory infestations as well as ophthalmomyiasis (Abuelhassan, 2010; Sucilathangam *et al.*, 2013; Sharma, 2018), so it's considered to be zoonotic (Allaie *et al.*, 2016; Al-Antary *et al.*, 2018; Velev and Mikov, 2018; Jenkins and Layton, 2018; D'assumpcao *et al.*, 2019). *O. ovis* has been reported in many countries both adjacent and non-adjacent to Yemen, including different regions of Saudi Arabia (Omar, 1988; Alahmed, 2000; Sharma, 2018; Alikhan *et al.*, 2018; Metwally *et al.*, 2021), the Sultanate of Oman (Victor and Bhargava, 1998; Abuelhassan, 2010), Egypt (Gaaboub, 1978; Osman, 2010), Sudan (Adam, 2015), and Djibouti (Dorchies *et al.*, 1995). In the past

several years, a huge number of livestock, especially sheep and goats, have been exported from African regions including Sudan, Somalia, and Djibouti

(Alexander, 2006). This could be the main reason the botfly was transported to Yemen, Oman, and Saudi Arabia.



Figure 1: Red spot indicating Taiz Governorat.

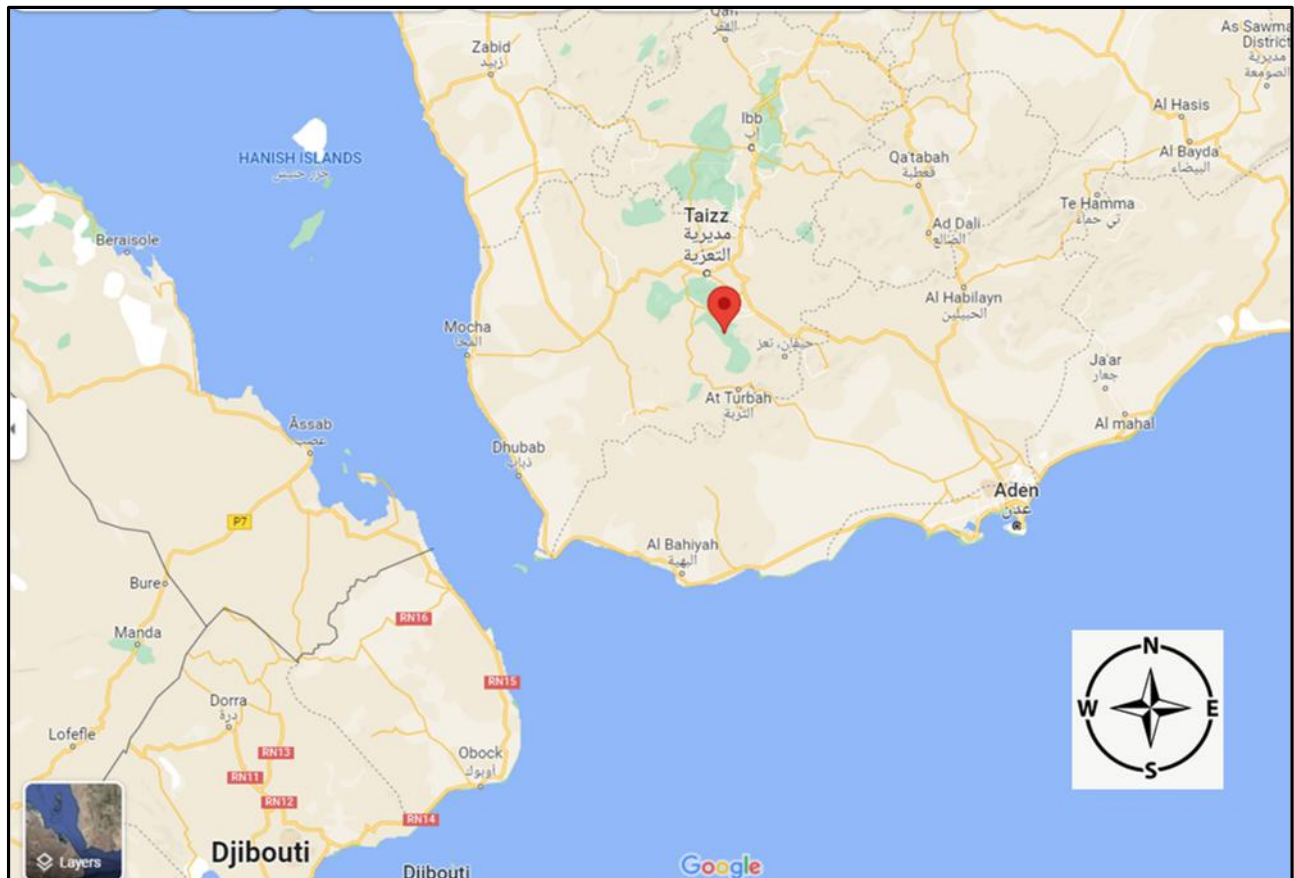


Figure 2: Red spot indicating the village of Al-Khanf, Aridat Shari at Same'a District, Taiz Governorate



Figure 3: Third instar larvae of *O. ovis*.



Figure 4: Posterior spiracle of the third instar larvae *O. ovis*.

Conclusion: The reporting of this case for first time in Yemen, as well as previous few reports from adjacent countries, I clearly suggest that there is a need to evaluate the economic losses suffered by the small ruminant industry due to this infestation of bot fly for development of suitable control measures.

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Novelty Statement: The current study is reporting the myiasis causing agent *O. ovis* for first time in Yemen.

And to show its biological potential as a zoonotic parasite infesting humans as well as animals.

Conflict of Interest: The authors have declared no conflict of interest.

REFERENCES

- Abuelhassan, A.A. (2010). External ophthalmomyiasis due to *Oestrus ovis*: A case report from Oman. *Oman Med. J.* 25(4) <https://doi.org/10.5001/omj.2010.94>
- Adam, H.O.W. (2015). Detection of Nasalbotfly Larvae in Slaughtered Sheep Heads in Alsalam Abattoir in Khartoum State–Sudan, Doctoral dissertation, University of Khartoum. <http://khartoumspace.uofk.edu/handle/123456789/9353>
- Ahaduzzaman, M. (2019). The global and regional prevalence of oestrosis in sheep and goats: A systematic review of articles and meta-analysis. *Parasite. Vectors.*, 12(1): 346. 1-17. <https://doi.org/10.1186/s13071-019-3597-2>
- Ahaduzzaman, M., M.S. Islam, S. Akter, M.J. Uddin, S.M.O. Sharif, and A. Mannan (2015). Asphyxial death by *Oestrus ovis* in a pneumonic goat. *J. Adv. Parasitol.*, 2(3): 48-51 <http://dx.doi.org/10.14737/journal.jap/2015/2.3.48.51>
- Alahmed, A.M. (2000). Seasonal infestation of *Oestrus ovis* larvae in sheep heads in central region of Saudi Arabia. *J. Egypt. Soc. Parasitol.*, 30(3): 895-901.
- Al-Antary, T.M., R.M. Nazzal, and E.T. Al-Antary, (2018). Ophthalmic myiasis externa caused by larvae of the sheep nasal botfly *Oestrus ovis* L. (Diptera: Oestridae) in Jordan. *Fresen. Environ. Bull.*, 27(3): 1923-1927.
- Alexander, J. L. (2006). Screwworms. *J. Am. Vet. Med. Assoc.* 228(3): 357-367. <https://doi.org/10.2460/javma.228.3.357>
- Ali, A., A.H. Feroze, P. Ferrar, A. Abbas, and M.A. Beg, (2006). First report of ophthalmomyiasis externa in Pakistan. *J. Pak. Med. Assoc.*, 56(2): 86-87. https://ecommons.aku.edu/pakistan_fhs_mc_surg_ophthalmol/35
- Alikhan, M., K. Al-Ghamdi, F.S. Al-Zahrani, E.I. Khater, and A.M. Allam, (2018). Prevalence and salient morphological features of myiasis causing Dipteran flies in Jeddah, Saudi Arabia. *Biosci. Biotechnol. Res. Asia.*, 15(1): 101-109. <http://dx.doi.org/10.13005/bbra/2612>
- Allaie, I.M., Z.A.Wani, A.H. Malik, R.A Shahardar, and M. Zulhuma. (2016). "*Oestrus ovis* larvae in nasal cavity of sheep: a case report." *J. Paras. Dis.* 40(4): 1221-1222. DOI: 10.1007/s12639-015-0655-3
- Abbas, G. and U.F. Amla, (2016). Ophthalmomyiasis Caused by Sheep Nasal Botfly (*Oestrus ovis*). *J. Coll. Physicians Surg. Pakistan* 26(2), 329-330. <https://www.jcpsp.pk/archive/2016/Apr2016/21.pdf>
- Cheshier, S.H., S.R. Bababegy, D. Higgins, J. Parsonnet, and S.L. Huhn, (2007). Cerebral myiasis associated with angiosarcoma of the scalp: case report. *Neurosurgery.*, 61(1), E167-E167. DOI: 10.1227/01.neu.0000279738.15307.37
- Curtis, J. (1840). *British Entomology: Being illustrations and descriptions of the genera of insects found in Great Britain and Ireland: Containing coloured figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found, Volume 8.*
- Dawud, A. and A. Aki, (2018). Review On Oestrosis On Sheep And Goat. *Researcher.* 10(8), 82-92. DOI:10.7537/marsrj100818.11.
- D'assumpcao, C., A. Bugas, A. Heidari, S. Sofinski, and R.A. Mcpheeters, (2019). A Case and Review of Ophthalmomyiasis Caused by *Oestrus ovis* in the Central Valley of California, United States. *J. Investig. Med. High Impact Case Rep.* 7, 1-5. <https://doi.org/10.1177/2324709619835852>
- Dorchies, P., G. Larrouy, P. Deconinck, and J. Chantal, (1995). Human external ophthalmomyiasis: A bibliographic review apropos of cases in the Republic of Djibouti. *Bull. Soc. Pathol. Exot.*, (1990) 88(3), 86-89.
- Dorchies, P., J.P. Alzieu, J.M. Yilma, F. Donat, D. Jeanclaude, and O. Chiarisoli, (1992). Prévention de l'œstrose ovine par deux traitements au closantel en cours d'été. *Appréciation Clinique et parasitologique. Rev. Med. Vet.* 143, 451-455
- Fasih, N., K.N. Qaiser, S.A. Bokhari, B. Jamil, and M.A. Beg, (2014). Human ophthalmomyiasis externa caused by the sheep botfly *Oestrus ovis*: A case report from Karachi, Pakistan. *Asian. Pac. J. Trop. Biomed.*, 4(10), 835-837. <https://doi.org/10.12980/APJTB.4.2014C901>
- Gaaboub, I.A. (1978). The distribution and seasonal dynamics of *Oestrus ovis* Linne infesting the nasal cavities and sinuses of sheep in Egypt. *Vet. Parasito.*, 4(1), 79-82. [https://doi.org/10.1016/0304-4017\(78\)90038-9](https://doi.org/10.1016/0304-4017(78)90038-9)
- Hasheminasab, S.S., H.M. Talvar, and I. Wright, (2015). First case report of *Oestrus ovis* in horns of goat despite the healthy sinuses and nasal passages with its morphological study from Iran. *Indian J. Anim. Res.* 50(2), 278-280. DOI: 10.18805/ijar.5928

- Hoyer, P., R.R. Williams, M. Lopez, and M.M. Cabada, (2016). Human nasal myiasis caused by *Oestrus ovis* in the highlands of Cusco, Peru: report of a case and review of the literature. *Case Reports in Infectious Diseases*, vol. 2016, Article ID 2456735, 4 pages, 2016. <https://doi.org/10.1155/2016/2456735>
- Hudson, G.V. (1892). *An elementary manual of New Zealand entomology. Being an introduction of our native insects.* West, Newman, & Co., London, 128
- Ipek, D.N.S. (2018). Prevalence and intensity of *Oestrus ovis* in sheep and goats in south-eastern part of Turkey. *Indian J. Anim. Sci.* 52, 1751-1756. DOI: 10.18805/ijar.B-717
- Jenkins, K.S. and C.J. Layton, (2018). External ophthalmomyiasis caused by *Oestrus ovis*. *Clin. Experiment. Ophthalmol.* 46(3), 300-301. DOI: 10.1111/ceo.13033
- Kamal, M., G. Yasmeen, F. Naz, N.U. Saher, N. Ahmad, W. Khan, and G.J. Yousafzai, (2021). Morphotaxonomy and allometry of *Oestrus ovis* (Linné, 1758) larvae (Diptera: Oestridae: Oestrinae). *J. Anim. Plant Sci.* 31(2), 604-609. <https://doi.org/10.36899/JAPS.2021.2.0248>
- Linnaeus, C. (1758). *Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Salvii, Stockholm, P. 824.
- Metwally, D.M., S.A. Albasyouni, I.A. Barakat, I.M. Al-Turaiki, A.M. Almuhanha, M.A. Bashir, H.B. Baghdadi, M.F. El-Khadragy, and R.A. Alajmi, (2021). Prevalence rate and molecular characteristics of *Oestrus ovis* L. (Diptera, Oestridae) in sheep and goats from Riyadh, Saudi Arabia. *Animals* 11(3), 689. <https://doi.org/10.3390/ani11030689>
- Masoodi, M. and K. Hosseini, (2004). External ophthalmomyiasis caused by sheep botfly (*Oestrus ovis*) larva: a report of 8 cases. *Arch Iranian Med.* 7, 136-139. <https://www.sid.ir/paper/279790/en>
- Omar, M.S, A.B. Das, and N.I. Osman, (1988). External ophthalmomyiasis due to the sheep nostril botfly larva *Oestrus ovis* in Saudi Arabia. *Ann. Trop. Med. Parasitol.* 82(2), 221-223. <https://doi.org/10.1080/00034983.1988.11812235>
- Osman, M.M. (2010). Epidemiological studies on *Oestrus ovis* infection, in sheep and goats in Shalatin area, Red Sea Governorate, Egypt. In: *Proceedings of the 3rd Scientific Conference of Animal Wealth Research in the Middle East and North Africa, Foreign Agricultural Relations (FAR), Egypt, 2010, (Massive Conferences and Trade Fairs)*, 25-40.
- Özdal, N., P. Tanritanir, F. Ilhan, and S. Değer, (2016). The prevalence of ovine oestrosis (*Oestrus ovis* Linnaeus, 1761, Diptera: Oestridae) and risk factors in Eastern Turkey. *Vet. Arhiv.* 86(3), 323-333. <https://hrcak.srce.hr/160431>
- Pallas, P.S. (1776). *Spicilegia zoologica quibus novae imprimis et obscurae animalium species iconibus, descriptionibus atque commentariis illustrantur.* Fasciculus undecimus, Berlin, 86 pp.
- Pape, T. (2001). Phylogeny of Oestridae (Insecta: Diptera). *Syst. Entomol.* 26(2), 133-171. <https://doi.org/10.1046/j.1365-3113.2001.00143.x>
- Patra, G., P. Biswas, A. Sahara, P. Behera and A. Debbarma (2018). Nasal Myiasis in animals due to Oestridae-A Mini Review. *Inter. J. Med. Phar. Drug Res.* 2(4), 48-54. <https://dx.doi.org/10.22161/ijmpd.2.4.1>
- Pezzi, M., T. Bonacci, M. Leis, E. Mamolini, M.G. Marchetti, S. Krčmar, and C. Scapoli, (2019). Myiasis in domestic cats: a global review. *Parasite. Vectors* 12(1), 1-14. <https://doi.org/10.1186/s13071-019-3618-1>
- Sharma, K. (2018). Ophthalmomyiasis externa: A case report from Alkharj, Saudi Arabia. *Saudi J. Ophthalmol.* 32(3), 250–252. <https://doi.org/10.1016/j.sjopt.2017.11.005>
- Sucilathangam, G., A. Meenakshisundaram, S. Hariramasubramanian, D. Anandhi, N. Palaniappan, and T. Anna, (2013). External ophthalmomyiasis which was caused by sheep botfly (*Oestrus ovis*) larva: A report of 10 cases. *J. Clin. Diagn. Res. JCDR* 7(3), 539-542. DOI: 10.7860/JCDR/2013/4749.2817
- Victor, R. and K. Bhargva, (1998). Ophthalmomyiasis in Oman: A case report and comments. *Wilderness Environ. Med.* 9(1), 32-35. [https://doi.org/10.1580/1080-6032\(1998\)009\[0032:OIOACR\]2.3.CO;2](https://doi.org/10.1580/1080-6032(1998)009[0032:OIOACR]2.3.CO;2)
- Velev, V. and O. Mikov, (2018). Ophthalmomyiasis caused by larvae of the parasite *Oestrus ovis*. *Int. J. Med.* 111(10), 727-728. <https://doi.org/10.1093/qjmed/hcy106>
- Widad, A.H.O. (2010). *Detection of Nasal Botfly Larvae in Slaughtered Sheeo Heads in Alsalam Abattoir in Khartoum State-Sudan.* Dissertation submitted to the University of Khartoum in partial fulfillment of the requirements for the Degree of Master of Tropical Animal Health (MTAH). Faculty of Veterinary Medicine University of Khartoum.
- Zumpt, F. (1965). Myiasis in man and animals in the old world. In: *A textbook for physicians, veterinarians, and zoologists.* London, Butterworth. pp. 267.