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Intestinal parasites of livestock in Tripoli Area - Libya

Mona M. Shaaban, Emhamed Boras, Mostafa M. Abdoarrahem*

Department of Life Science, School of Basic Science, Libyan Academy, Tripoli-Libya.

Abstract: Livestock, particularly sheep, play an important role in supporting both livelihoods and the economy in many parts of the world. However, gastrointestinal parasitic infections remain one of the major health problems affecting sheep production. These infections are more commonly seen in young animals, older sheep, and those that are immunocompromised or already suffering from other diseases. The severity of parasitism depends on several factors, including the type of parasite, its life cycle, and the condition of the host animal. In Libya, there is still limited information available regarding gastrointestinal parasites in sheep. For this reason, the present study was carried out to assess the prevalence of gastrointestinal parasites among sheep in Tripoli and to evaluate some associated risk factors. A cross-sectional study was conducted using 240 fecal samples collected from sheep on 23 farms distributed across six municipalities in Tripoli (Al-Swani, Janzur, Al-Garabulli, Tajura, Qasr Bin Ghashir, and Sidi Salim). The samples were examined using flotation and McMaster egg-counting techniques. Overall, 81.25% of the examined samples were positive for at least one type of gastrointestinal parasite. Strongyle-type eggs were the most frequently detected (79.2%). The highest infection rates were recorded in Al-Swani (93.5%) and Janzur (84.0%). Nematodirus eggs were found in 13.8% of the samples, with Sidi Salim showing the highest rate (36.1%). Eimeria oocysts were detected in 13.3% of the samples, and Janzur had the highest prevalence (34.0%). *Moniezia expansa* and *Moniezia benedeni* eggs were identified in 9.2% and 1.3% of samples, respectively. Age and body condition were significantly associated with infection. Sheep under one year of age showed higher infection rates (86.3% in females and 72.4% in males; P = 0.016). Animals with poor body condition were all infected (100%), compared with those in medium (87%) and good (61%) body condition. Sheep that received regular preventive anthelmintic treatment had lower infection rates. In conclusion, gastrointestinal parasitic infections are highly prevalent among sheep in Tripoli, with rates appearing higher than those reported in some neighboring countries. These findings highlight the need for regular monitoring and improved parasite control strategies to reduce economic losses and improve animal health.

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الطفيليات المعوية للماشية في منطقة طرابلس – ليبيا

منى م. شعبان*، إمحمد بوراس، مصطفى م. عبد الرحيم

قسم علوم الحياة، كلية العلوم الأساسية، الأكاديمية الليبية، طرابلس - ليبيا

* *Department of Life Science, School of Basic Science, Libyan Academy, Tripoli-Libya, mostafa@academy.edu.ly*

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تلعب الماشية، وخاصة الأغنام، دورًا مهمًا في دعم سبل العيش والاقتصاد في أجزاء كثيرة من العالم. ومع ذلك، لا تزال العدوى الطفيلية المعوية واحدة من أكبر المشاكل الصحية التي تؤثر على إنتاج الأغنام. تُلاحظ هذه العدوى بشكل أكثر شيوعًا في الحيوانات الصغيرة، والأغنام الأكبر سنًا، وتلك التي تعاني من نقص المناعة أو التي تعاني بالفعل من أمراض أخرى. تعتمد شدة الإصابة بالطفيليات على عدة عوامل، بما في ذلك نوع الطفيلي، ودورة حياته، وحالة الحيوان المضيف. في ليبيا، لا تزال المعلومات المتاحة حول الطفيليات المعوية للأغنام محدودة. لهذا السبب، أُجريت هذه الدراسة لتقييم مدى انتشار الطفيليات المعوية بين الأغنام في طرابلس وتقييم بعض عوامل الخطر المرتبطة بها. أُجريت دراسة مقطعية باستخدام 240 عينة براز تم جمعها من أغنام في 23 مزرعة موزعة على ست بلديات في طرابلس (السواني، وجنزور، والقره بوللي، وتاجوراء، وقصر بن غشير، وسيدي سالم). تم فحص العينات باستخدام تقنيات الطفو وعد البيض بطريقة ماكماستر. بشكل عام، كانت 81.25% من العينات المفحوصة إيجابية لنوع واحد على الأقل من الطفيليات المعوية. كانت بيوض النوع القوي (Strongyle-type) الأكثر اكتشافًا (79.2%). سُجلت أعلى معدلات الإصابة في السواني (93.5%) وجنزور (84.0%). تم العثور على بيوض النيماتوديروس (Nematodirus)في 13.8% من العينات، حيث أظهرت سيدي سالم أعلى نسبة (36.1%). تم الكشف عن أكياس الأيميريا (Eimeria) في 13.3% من العينات، وكانت أعلى نسبة انتشار في جنزور (34.0%). تم التعرف على بيوض المونيزيا إكسبانسا (Moniezia expansa) والمونيزيا بينيديني (Moniezia benedeni) في 9.2% و 1.3% من العينات على التوالي. ارتبط العمر وحالة الجسم ارتباطًا كبيرًا بالعدوى. أظهرت الأغنام التي يقل عمرها عن عام واحد معدلات إصابة أعلى (86.3%) في الإناث و 72.4% في الذكور؛ (P = 0.016). كانت جميع الحيوانات ذات الحالة الجسدية السيئة مصابة (100%)، مقارنة بتلك ذات الحالة المتوسطة (87%) والجيدة (61%). سجلت الأغنام التي تلقت علاجًا وقائيًا منتظمًا بمضادات الطفيليات معدلات إصابة أقل. في الختام، الطفيليات المعوية منتشرة بشكل كبير بين الأغنام في طرابلس، حيث تبدو المعدلات أعلى من تلك المبلغ عنها في بعض البلدان المجاورة. تسلط هذه النتائج الضوء على الحاجة إلى مراقبة منتظمة وتحسين استراتيجيات مكافحة الطفيليات للحد من الخسائر الاقتصادية وتحسين صحة الحيوان.

الكلمات المفتاحية

الطفيليات المعوية

الماشية

طرابلس ليبيا

1. Introduction

Sheep (Ovis aries) are domesticated ruminant mammals belonging to the family Bovidae. They are believed to have originated from wild mouflon (Ovis musimon) populations in Sardinia and Corsica [1]. Globally, the sheep population is estimated at over 1.1 billion, with Africa accounting for nearly 30% of this total (approximately 352 million sheep). In Libya, the sheep population is estimated at around 7 million [2,3]. Gastrointestinal (GI) parasites are an important component of livestock ecosystems and can significantly affect the immune status of their hosts [4]. Gastrointestinal parasites are important and widely spread in livestock worldwide [5].

The transmission, incidence, and severity of parasitic infections depend on multiple hosts, parasite, and environmental factors. These include climatic and meteorological conditions, grazing management practices, livestock production systems, host age, nutritional status, immune response, larval hypobiosis, concurrent infections, sex, species, and genetic resistance. Environmental factors such as rainfall, temperature, humidity, vegetation type, season, and microclimate play a particularly important role. In addition, stocking density and the frequency and type of anthelmintic treatment often influenced by farmers' management practices can significantly affect parasite development and spread [9].

Despite the importance of gastrointestinal parasites, limited data are available regarding their prevalence and distribution in small ruminants in Libya. Therefore, this study aimed to determine the prevalence of gastrointestinal parasitic infections in sheep in the Tripoli area and to identify associated risk factors.

2. MATERIALS AND METHOD Study Area:

The study was conducted in Tripoli, the capital city of Libya, located in the northwestern part of the country (Figure 1). The city covers an area of approximately 3,127 km^2 and is situated at 32.685306° N latitude and 13.175778° E longitude. Tripoli has a typical Mediterranean climate, characterized by hot, humid, and dry summers and relatively cold, windy winters. The hot season usually extends from May to October, while the cooler season lasts from December to March. Throughout the year, temperatures typically range from 9.4°C to 33.3°C and rarely fall below 6.6°C or exceed 38.3°C. Humidity levels vary seasonally, reaching higher levels in August (up to 83%) and lower levels in January.

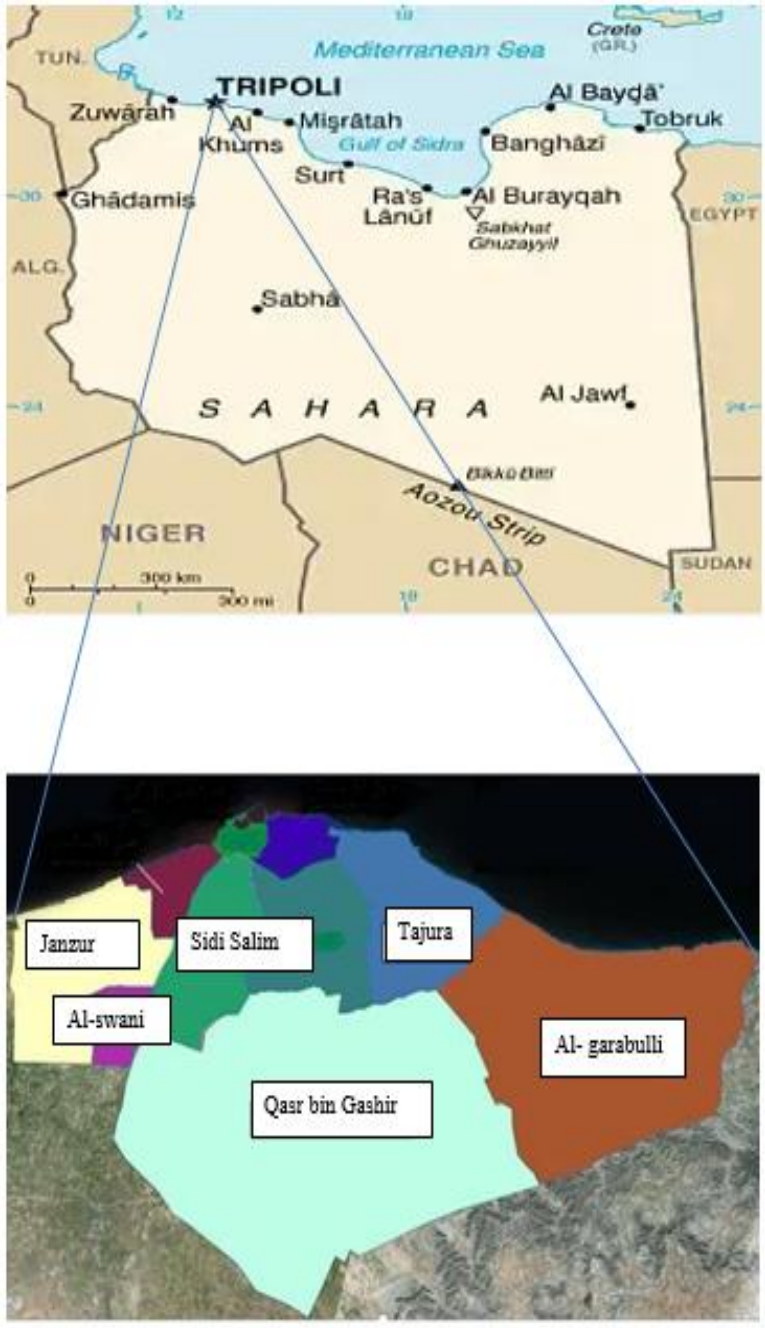

Figure (1). Location of study area of Tripoli-Libya [10].

2.1. Study Design:

A cross-sectional study was conducted between September 2022 and June 2023 to determine the prevalence of gastrointestinal parasites in sheep through qualitative and quantitative faecal examinations. A structured questionnaire was designed to collect relevant demographic and management information, including age, sex, body condition, vaccination status, and source of animals.

2.2. Study samples

A total of 240 fecal samples were randomly collected from sheep raised on 23 semi-closed farms located in six municipalities of Tripoli: Al-Swani, Janzur, Al-Garabulli, Tajura, Qasr Bin Ghashir, and Sidi Salim. Sampling considered different age groups (<1 year, 1–2 years, and >2 years) and both sexes (male and female).

2.3. Faecal Samples Collection

Approximately 10 g of faecal material was collected directly from the rectum from each animal using hygienic procedures and transferred into a sterile container. Each sample was labelled with a unique identification number and transported to the Parasitology Unit of the National Centre for Animal Health (NCAH) for examination. All relevant questionnaire data were recorded at the time of sampling. Samples were stored at 4°C until laboratory analysis C° [12].

2.4. Laboratory Examination

Fecal samples were examined using both qualitative and quantitative techniques.

- Qualitative methods: Flotation and sedimentation techniques were used to detect parasite eggs and oocysts, which were identified based on their morphological characteristics.
- Quantitative method: The McMaster technique was used to determine eggs per gram (EPG) of feces.

2.5. Identification and Data Analysis

Parasites were identified based on egg shape and size. Data were entered into Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics were used to calculate prevalence percentages and proportions. Associations between risk factors and parasitic infection were assessed using the chi-square test. Statistical significance was set at $P < 0.05$.

3. RESULTS

3.1. The overall prevalence of gastrointestinal parasites infection in sheep in Tripoli area.

Out of the 240 faecal samples examined, 195 (81.2%) were positive for at least one gastrointestinal parasite. Strongyle-type eggs were the most commonly detected (79.2%). Nematodirus spp. eggs were found in 13.8% of samples, Eimeria spp. oocysts in 13.3%, Moniezia expansa in 9.2%, and Moniezia benedeni in 1.3% (Figure 2).

3.2. Prevalence by Municipality.

Among the municipalities, Al-Swani and Janzur recorded the highest prevalence of Strongyle-type eggs (93.5% and 84.0%, respectively). Nematodirus spp. showed the highest prevalence in Sidi Salim (36.1%) and was not detected in Janzur. Eimeria spp. oocysts were most prevalent in Janzur (34.0%) and were not detected in Al-Garabulli or Sidi Salim.

Statistical analysis revealed a significant association between municipality (pasture area) and type of parasite infection (χ^2 = 164.852, df = 60, P < 0.05). The coefficient of agreement (0.638) indicated a strong relationship.

Females showed a higher infection rate (86.3%; 132/153) compared to males (72.4%; 63/87), with a statistically significant association between sex and infection (P = 0.016).

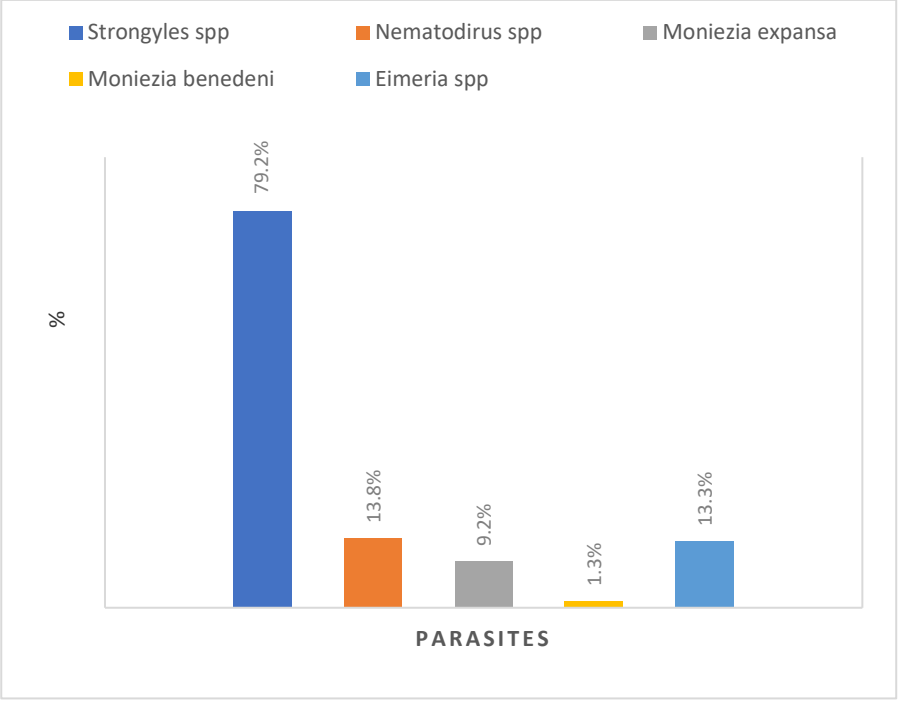

Figure (2). Prevalence of gastrointestinal parasites infection in sheep

3.3. Prevalence by Age Group.

The highest infection rate was observed in sheep less than one year old (82.3%), followed by those aged 1–2 years (80.7%) and those older than 2 years (80%). However, the differences were not statistically significant (P = 0.215).

4. DISCUSSION.

This study provides baseline information on the prevalence of gastrointestinal parasites in sheep in Tripoli. The overall prevalence of 81.2% indicates a high level of infection in the study area. Mixed infections involving more than one parasite genus were commonly observed, consistent with findings reported in previous studies conducted in other countries [13-16]. Strongyle-type nematodes were the most prevalent parasites identified. Because their eggs are morphologically similar, they were classified collectively as Strongyle-type rather than identified to genus level [17]. The prevalence of GI parasites is strongly influenced by agro-climatic conditions, including pasture availability, temperature, humidity, and grazing behaviour [18]. The high prevalence observed may be related to favorable environmental conditions that support larval survival and development. Management factors such as animal movement, grazing practices, and exposure to contaminated feed and water may also contribute [19, 20].

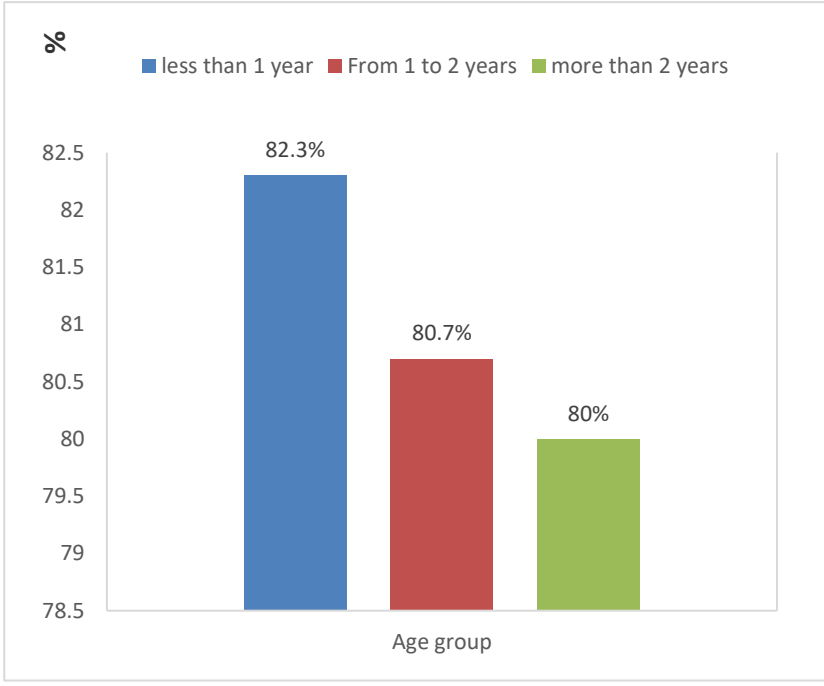

Figure (3). The rate of gastrointestinal parasites of sheep according to age group (the chi-square statistic is 29.148 ; p-value =0.215).

Although younger animals (<1 year) showed slightly higher infection rates, age was not significantly associated with infection in this study. The higher susceptibility in younger animals may be due to incomplete development of immunity.

Body condition was significantly associated with infection. Animals with poor body condition showed the highest prevalence (100%), followed by those with moderate condition (87.4%), while animals in good condition had the lowest prevalence (61.0%). Poor nutritional status may compromise immunity and increase susceptibility to parasitic infections.

In conclusion, gastrointestinal parasitic infections are highly prevalent among sheep in Tripoli, with Strongyle-type nematodes being the most common parasites detected. Female sheep and animals with poor body condition were more frequently infected. These findings highlight the need for improved parasite control strategies, including regular monitoring, strategic use of anthelmintics, improved farm management, and increased farmer awareness. Future studies using advanced diagnostic methods such as molecular techniques are recommended.

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Conflict of Interest: The authors declare no conflict of interest.

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