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Prevalence of Gastrointestinal Parasites in Backyard Sheep in the Municipal Seat of Cuajinicuilapa, Guerrero, Mexico

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Abstract

Sheep farming is a peculiar activity of great importance; however, gastrointestinal parasites are one of the most significant problems that affect production. The objective of the present study was to identify parasite genera, and to determine the prevalence and parasite load of parasite eggs that affect ovine livestock in the municipal capital of Cuajinicuilapa, Guerrero. The eggs were observed using the flotation technique with glucose solution was used and the McMaster technique was used to enumerate the eggs. The analysis was conducted on a sample of 78 females and 10 males. The prevalence of parasitic genera was found to be 89% in female subjects and 11% in male subjects. The eggs identified corresponded to protozoa of the genus Coccidia, as well as Strongylids, Teladorsagia and Trichuris. The presence of various parasitic genera is a matter of both economic and welfare concern. The study demonstrates the necessity for strategies to control gastrointestinal parasites in sheep production systems.

Keywords: Ovis Aries, Endoparasites, Prevalence.

1. Introduction

Sheep farming represents a pivotal livestock industry. The sheep population comprises rams, ewes, and their offspring make up the sheep population, which are reared to meet the demand for sheep products intended for human consumption [1]. An important characteristic is that sheep are highly adaptable to a wide range of environments [2]. Therefore, sheep farming is a sustainable livelihood resource option, as these small ruminants can utilize low-quality biomass in times of scarcity and transform it into useful products, such as milk, meat, and wool [3]. As in any other type of livestock farming, health problems affecting sheep prevail, such as diseases caused by bacteria, fungi, parasites, and viruses [4]. In many regions, sheep are predominantly fed on grazing, which has been shown to increase the likelihood of the proliferation of different parasites, which in turn affect production yields [5]. Gastrointestinal parasitosis represents a significant challenge to livestock production, resulting in substantial economic losses due to reduced meat yield, reproductive issues, and mortality, particularly among young animals [6]. Nematodes, flatworms, and protozoa are the organisms primarily involved in gastrointestinal parasitosis (GIP), which sometimes may not develop any clinical signs. However, they can occasionally cause high mortality [7]. These diseases are prevalent in extensive sheep production systems, underscoring the necessity for research to facilitate the detection and quantification of the parasitic load [8]. The objective of the present study was to identify parasite genera and determine the prevalence and parasitic load of parasite eggs affecting ovine livestock in the municipal seat of Cuajinicuilapa, Guerrero.

2. Material & Methods

2.1. Date and Location of the Study Area

The present study was conducted during the months of May and June 2023, in selected production units in the municipality of Cuajinicuilapa, Guerrero. The geographical area under consideration is situated between 0 and 200 meters above sea level. The region's climate is characterized by warm subhumid conditions, marked by summer rainfall, with an annual mean precipitation of 1200 mm and an average annual temperature of 26 °C. The community is constituted of 105 localities and occupies 1.0% of the regional surface area. The region under discussion is bordered to the north by the municipalities of Juchitán, Azoyú, and Ometepec; to the east by the municipality of Ometepec and the State of Oaxaca; to the south by the State of Oaxaca and the Pacific Ocean; and to the west by the Pacific Ocean and the municipalities of Marquelia and Juchitán [9].

2.2. Sampling Site and Animal Selection

Sheep production units were selected and located in the neighborhoods near the municipal seat of Cuajinicuilapa (Table 1). The owners were subsequently interviewed to

inquire about their willingness to provide their animals for sample collection. Once the owners' consent was obtained, the samples were taken. The production units visited had a population of between 1 and 10 sheep. In some units, all females and the male were sampled. In units with a larger number of animals, samples were collected from nine females and one male, in compliance with the recommendation to include at least 10 animals per group [10].

No.	Suburb	Latitude (N)	Longitude (w)	masl*
1	Las Brisas	16°27´59"	98°24´58"	44
2	Guadalupe	16°28´05"	98°24´56"	49
3	La Gloria	16°28´45"	98°25´17"	38
4	Vicente Guerrero	16°28´22"	98°24´40"	54
5	Abajo	16°28´29"	98°25´05"	49
6	San Francisco-1	16°28´35"	98°25´47"	46
7	San Francisco-2	16°28´24"	98°25´72"	52
8	2 de Diciembre-1	16°28´45"	98°24´33"	51
9	2 de Diciembre-2	16°28´44"	98°24´33"	50
10	2 de Diciembre-3	16°28´45"	98°24´32"	49
N: north; W: west; *masl: meters above sea level				

Table 1: Location of Production Units

2.3. Type of Study

A descriptive observational study was conducted. According to a descriptive study is a quantitative research study. It presents a single study variable, called the variable of interest. As its name suggests, it allows for the description of situations, phenomena, or events of interest, measuring them and highlighting their characteristics. In the present study, the presence or absence of parasite eggs in the animals was determinated [11].

2.4. Sample Collection and Processing

The production units were visited at 7:00 am, and commencement of sample collection was initiated. Initially, the animal was restrained by means of the restraint techniques described by [12]. Once the animal was restrained, fecal samples were obtained directly from the animal's rectum using a latex glove [13]. The samples were then placed inside the glove, which was identified with a marker. The number of animals, their sex, the production unit, and the owner's name were recorded in a logbook. The samples were stored refrigerated in a cooler at 4°C to ensure their protection and were subsequently transferred to the Multidisciplinary Laboratory of the Faculty of Veterinary Medicine and Animal Science No. 2 of the Autonomous University of Guerrero, located in the municipal seat of Cuajinicuilapa, for processing in the laboratory, all samples were processed using the methodology described by [14]. The fecal samples were weighed from each sample using a digital scale (Truper, Mod. 102326) to the nearest 2 g. The samples were then placed in a mortar and pestle, followed by 18 mL of glucose solution. After the completion of the mixture, it was subjected to filtration, after which the contents were transferred into a clinical sample container (Plastic World, 120 mL) and permitted to stand for a period of five minutes. After this interval, a portion of the serum was extracted using a plastic pipette and transferred into a 3-milliliter blood sample tube (BD Vacutainer, 5 mL). Once the tubes were filled with the sample, they were placed in a centrifuge (Hermle, Z3000) and subjected to a centrifugation process at 3000 x g for a duration of five minutes. The tubes were then extracted and placed in a rack to rest for a period of 15 minutes. After this time, a portion of the sample was extracted with the aid of a plastic pipette. As described by [8]. The camera was situated on a compound microscope (Velab, VE-B7) and the egg count was conducted through observation with the 10X objective.

3. Results

A total of 88 samples were analyzed, of which 78 were female and 10 were male, giving a ratio of 8:1. The prevalence of parasitic genera was found to be 88.7% among the female subjects and 11.3% among the male subjects (Table 2). The prevalence of helminth infections was examined from lowest to highest and categorized by sex. Among the female subject, 5 (6.4%) were positive for *Trichuris* spp., 34 (43.6%) for *Coccidia* spp., 42 (53.9%) for *Paraphistomum* spp., and 56 (71.8%) for *Teladorsagia* spp. Among the male subjects, 1 (10.0%) was positive for *Trichuris* spp., two (20%) for *Coccidia* spp., seven (70%) for *Strongylidae* spp., and eight (80%) for *Teladorsagia* spp. Figure 1 shows the observed eggs of the parasites found per two grams of feces.

Sex	Protozoa	Nematode	Trematodes	
	Coccidia spp.	*T. (Ostertagia)* spp.	*Trichuris* spp.	*Strongylida*
Female	755	1453	9	1080
Male	75	742	2	677

Table 2: Parasitic Genera and Number of Eggs Present in Feces

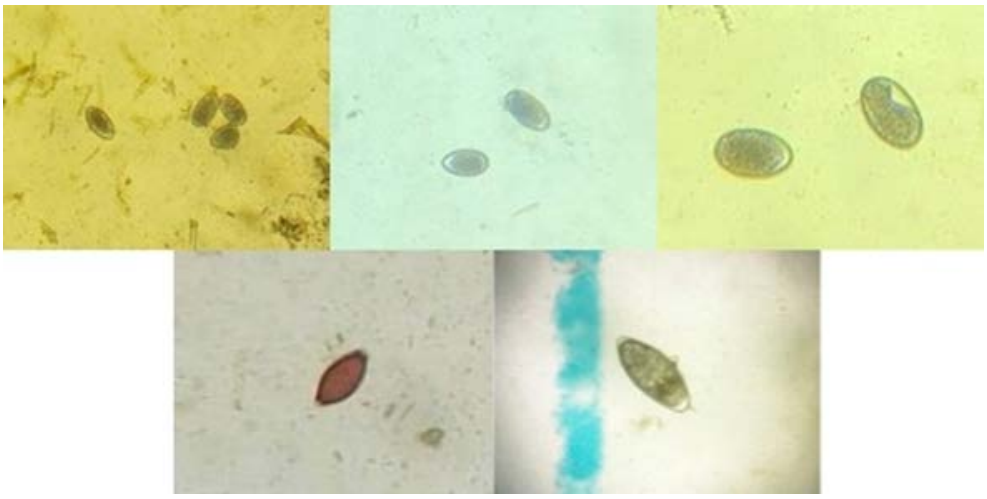

Figure 1: Parasite Eggs Observed in the Study. a-b: *Coccicia* spp., c: T. (*Ostertagia*) spp., d: *Trichuris* spp., e: *Strongyle* spp

4. Discussion

The results of this study report the presence of eggs of various genera of gastrointestinal parasites in the feces of sheep from different production systems in the municipal seat of Cuajinicuilapa, Guerrero. Sheep are of immense economic importance, with a significant impact on the livelihoods of a large number of households. However, diseases impede the productivity of these small ruminants [15]. The prevalence of gastrointestinal parasites under field conditions is often mixed and consists of different species of nematodes, in addition to the presence of coccidia [16].

Trichuris spp. are gastrointestinal parasites found in a wide range of hosts; they are the causative agents of a neglected tropical disease that causes significant animal and human health problems, as well as considerable socioeconomic consequences worldwide [17]. In a study conducted in the state of [8]. Observed an infestation rate of 30.0%; while in the state of Mexico, [18]. Reported a prevalence of 38.1%. the two aforementioned studies evaluated ovine subjects raised under extensive conditions, as did the animals utilized in the present study; both prevalences exceed those obtained in this report. In Argentina, in the Pampa region, [19], Obtained an infestation rate of 58.4% in lambs for consumption from five departments of a semi-arid region. On the other hand, in two different parts of Ukraine, [20], found that 65.9% were positive for this parasite in ovine subjects; while in China, [21], obtained a rate of 86.1% positive for these parasites, also in ovine subjects. It is suggested that the wide variety of species could be related to the frequency of sheep trade, geography, and the age of the sheep, which may be related to the incomplete development of the immune system in lambs or to the immunity to the parasites of adult individuals [21].

Coccidia or *Eimeria* are obligate intracellular protozoa whose development in the cytoplasm of epithelial cells causes hyperplasia and death of the parasitized cell. Sheep are susceptible to various species of these parasites, and the disease can be severe, especially in small animals [22]. In their study in the state of Michoacán, reported a prevalence of 77.4%, which is lower than that obtained in this work [23]. The prevalence in this study exceeds 80.0%, though it is lower than that reported by who found an infestation rate of 91.17% in the state of Yucatán [24], Conducted a study to diagnose coccidiosis in three sheep production units, obtaining prevalences of 45.0%, 72.0% and 93.0%, respectively. The latter two prevalences correspond to those observed in the present study and in that of [24,25]. In addition to the factors associated with the age and management of the animals, the frequency of coccidiosis is higher during the rainy season because it is positively influenced by the warm and humid climate [22].

T. (Ostertagia) circumcincta, colloquially referred to as the brown stomach worm, is a nematode that parasitizes ovine species. This parasite is responsible for considerable economic losses, as it causes severe damage. This parasite produces reduced appetite, poor growth, weight loss, and intermittent diarrhea, since highly infested animals are protein deficient [26]. In the present study, the prevalence of the condition was found to exceed 70.0%. In Colombia, [27], reported an infestation rate of 22.3%, 27.3%, and 28.6% in sheep under confinement, grazing, and semi-confinement conditions, respectively. The preceding author suggests that a rest period in pastures and the prior cleansing of the enclosures in which the animals will subsequently reside are pivotal in the reduction of infection and parasitic load. In Mexico, research on this parasite has been predominantly

concerned with its morphological identification in the rumen of slaughtered animals [28,29,30]. However, there is a necessity for further in-depth studies to be conducted on its prevalence, with a particular focus on the identification of eggs in feces. A substantial degree of variation is observed among animals with regard to fecal egg counts. The development of free-living nematodes is influenced by temperature and humidity; furthermore, there is considerable variation between the age and number of ingested larvae. The number of infective larvae gradually decreases at the end of the grazing season, when grass growth also decreases; research is lacking to help elucidate various aspects of the epidemiology of this parasite [26].

In the present study, the prevalence of all gastrointestinal parasites was variable; this could be related to differences in agroecology and husbandry practices; variations may also be due to location, type of production system, and climatic variations [16]. Despite the absence of formal consultations on deworming practices at the intervention sites, daily routine indicate that all sheep are routinely dewormed without regard for their individual fecal egg counts. It would be prudent to conduct pre-deworming counts to ensure that deworming is selective and targeted, i.e., to determine whether the animals need it or not; in addition to rotating dewormers [31].

Gastrointestinal parasites were detected at all collection sites, with coccidia representing the most prevalent parasitic burden. The presence of various parasitic genera is an economic and welfare concern, leading to low productivity and other effects such as morbidity and mortality. The study demonstrates the necessity for gastrointestinal parasite control strategies in family farming systems to enhance productivity and mitigate the development of resistance to essential parasite treatments. Further research is required in order to establish the effects of these parasites on human health and their economic losses.

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