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Prevalence and Associated Risk Factors of Lice in Sheep and Goats in Mosul City- Iraq

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Abstract

PEDICULOSIS is considered one of the most significant veterinary parasitic diseases causing economic losses. The study aimed to evaluate the prevalence and associated risk factors of lice in sheep and goats. This study was applied in a period from January 2022 to December 2022. A total of 1170 sheep and 470 goats were examined. The total infestation rates of the examined animals were higher in goats (57.02%) than in sheep (50.43%). The predominant species infesting sheep were Linognathus spp. and *Damalina ovis* (D. ovis), while in goats were *Linognathus stenopsis* (*L. stenopsis*) and *Damalina capri* (*D. capri*). Sheep were highly infested with *D. ovis* (76.2%) followed by Linognathus spp. (16.9%) and the mixed infestation was 6.7%. Linognathus spp. in goats was 78.3% and D. capri was 14.1% while mixed infestation was 7.4%. In sheep, the highest infestation rate was recorded during winter months (60%), while the lowest infestation rate was recorded during autumn months (40%). No significant differences regarding age, local and foreign breeds were recorded. There was a significant difference in the infestation rate between males (32.2%) and females (68.97%). The highest infestation rate was (55%) in Al-Shura; while the lowest rate was recorded in Nineveh Plain (40%). Regarding feeding system, the highest infestation rate was (55.71%) for indoor feeding. Concerning goats, the infestation rate was high during the summer months (65%), while the lowest infestation rate was recorded in the spring months (50%). Age groups more than 3 years recorded 71.76% infestation rate compared with groups less than 3 years (39.53%). The optimum recorded infestation rate is (76.6%) in female groups compared with (37.45%) in male groups. The infestation rate was significant in local breeds (64%) compared with foreign breeds. Bazwaya area was the highest infested locality (88.33%). Outdoor feeding recorded (69.16%) compared with (52.5%) for outdoor feeding. Clinical examination of ruminants' skin revealed the presence of lice accompanied by their eggs on the skin of highly infested goats showing hair damaged and hair fall spots due to heavy infestation. This study showed that lice are the predominant ectoparasite infesting sheep and goats causing skin damage and consequently severe economic losses.

Keywords: lice infestation, sheep, goats, Linognathus, Damalina.

Introduction

Pediculosis is an ectoparasitic disease threatening both human and animals either through their feeding habits (blood sucking and chewing) or by their ability in transmitting diseases and the majority of the 5000 identified species of lice are infesting wild birds and mammals [1, 2]. Lice affect the productivity and growth of sheep, goats, cattle and buffalo herds [3]. Ruminants are considered primary sources of animal protein and provide important products such as bones and skin. Nevertheless, the economic benefits obtained from these animals are often affected by external parasites such as lice which are common in ruminants. The Order: Phthiraptera contains two diverse morphological sets: biting louse and sucking louse. Those who feed on mammalian blood are sucking lice, while biting lice include species infesting birds or mammals. Although some chewing lice intake blood others ingest skin, feathers, fur, or skin products. Due to these diverse habits of feeding in the two groups; the sucking louse is more significant than the chewing louse in conveying diseases [4, 5]. On the skin of host, all developmental stages of the lice occur and the louse dies when deprived from their host in a short time. Stages of the life cycle in lice are: eggs, 3 nymphal stages and adult. Nymphs resemble adults so metamorphosis is simply well adapted and highly host specific to birds and mammals. Lice differs from ticks and fleas because lice commonly spend most of

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their entire lifecycle on host and also have specific anatomical locations in any host. The Phthiraptera order is further divided into 4 suborders but only Anoplura and also Ischnocera have species that infest ruminants. Anoplura are known as blood sucking lice while Ischnocera (Mallophaga) are known as chewing or mandibulate lice [2,6]. The suborder: Anoplura consists of numerous clans, two of which are of medical interest to vets; the family Haematopinidae such as *Haematopinus tuberculatrus* (buffalo louse) and family: Linognathidae such as *Linognathus ovillus* (long-nosed sheep louse) and *Linognathus stenopsis* (goat sucking louce). While suborder Ischnocera includes five families, Bovicolidae family contains the Bovicola genus (previously Damalinia) on cattle, sheep, deer and horses such as *Bovicola bovis* (*Damalina bovis*) and *Bovicola ovis* [7]. Thise study aimed to determine the prevalence of lice in ruminants (sheep and goats) and associated risk factors including season, age, sex, location, breed and feeding system.

Material and Methods

Study areas and samples collection

The study was carried out from January 2022 to December 2022. A total number of 1170 sheep and 470 goats were examined. Samples were obtained from specific parts of the ruminant bodies such as head, neck, trunk and legs. Lice collection was carried through brushing with lice-comb [8]. The data about months, sex, age, breed and feeding system were obtained from owners and documented in special data form.

The study area included both left and right sides of Mosul city. Sheep lice samples were collected from herds located in Al-Mahlabiya (Sitta), Qayyarah, Bazwaya, Gogjali, Nineveh Plain, Al-Shura, Tubzawa, Tuwaitla, Tirawa, Al-Dawanem, local Markets and the Teaching Hospital at the Veterinary Medicine College - University of Mosul. The examined breeds were from the Awassi lamb, Al-Hamdani and Al-Kuradi, as well as from Turkey and Iran. Goat lice samples were collected from herds located in Gogjali, Bazwaya, local Markets and the Teaching Hospital at the Veterinary Medicine College - University of Mosul. The examined breeds were local types from Afghanistan and Shami. Samples also were from animals fed on concentrated food (indoor), and in grazing yards (outdoor).

Post collection, samples were preserved in 70% ethyl Alcohol in plastic containers and then brought to the laboratory of Veterinary Medicine / University of Mosul. Samples were examined using a dissecting microscope and lice images were taken using a digital Canon camera. Identification of lice species was carried depending on the identification keys by Taylor *et al.* [7].

Statistical analysis

Th Descriptive statistics analysed data by using (IBM, SPSS v27, UK) data has been confirmed normally distributed using Shapiro-Wilks test, differences of infestation ratio among groups demonstrated with Chi- square (cross tabulation) and followed with Bonferroni correction to estimate differences within groups, all tests were performed at a significant level of $P \leq 0.01$ [9].

Results

Results showed that total infestation rates were higher in goats (57.02%) than in sheep (50.43%) as shown in (Table 1).

Risk factors assessment of lice infestation

Lice infestation in sheep according to the months of the study was shown in (Table 2). The infestation rate was the highest in January, February and March (60%) at $p \leq 0.05$, followed by April, May and June (54.3%) at $p \leq 0.05$, while the lowest infestation rate was recorded during the months of October, November, December (44.4%) and in July, August, September was (40%) at $p \leq 0.05$. Regarding age, the infestation rate in animals less than 3 years was (49.62%), and more than 3 years was (51.46%) with no significant differences between them. According to sex, there was a significant difference in lice infestation between females (68.97%) and males (32.20%). As for breed, the results revealed no significant differences between local, Turkish and Iranian breeds which recorded 50.5%, 50% and 51.21%, respectively. According to areas of study, the study revealed that the highest infestation rate was in Al-Shura, Qayyarah and Al-Mahlabiya (Sitta) 55%, 53.84% and 52.63% respectively followed by Tubzawa, Tirawa, Tuwaitla which recorded 50% with no significant differences between them; while the lowest rates were recorded in Gogjali, Bazwaiya and Nineveh Plain recorded 46.66%, 46.15% and 40% respectively with no significant differences. The results of the feeding system showed that indoor feeding is higher than outdoor feeding and recorded 55.71% and 42.55% respectively as in (Table 2).

Concerning goats, the lice infestation was the highest during July, August and September (65%), followed by October, November and December (60%) in addition, January, February and March (58.89%), while the lowest infestation rate was recorded during April, May and June (50%). Regarding age, there was a significant difference between animals more than 3 years (71.76%) and less than 3 years (39.53%). Moreover, the infestation in females (76.6%) was significantly higher than in

males (37.45%). The local breeds showed a significant infestation rate (64%) compared with foreign breeds (Afgani and Shami). Results showed that Bazwaya area has the highest infestation rate (88.33%) compared with City Centre and Gogjali (61.33%) and (47.3%), respectively. The feeding system showed that the outdoor system recorded (69.16%) higher than the indoor system (52. 5%) (Table 3).

Macroscopic examination of ruminant skin

Clinical gross examination of ruminant's skin revealed the presence of lice and their eggs (Figures 1 a, b, c, d). Goat skin with heavy infestation showed hair damaged and hair fall spots. The results in (Table 4) shows two species of lice infesting sheep; sucking lice *Linognathus spp.* (Fig. 2 a,b) and biting lice *D. ovis* (Fig. 2 c,d), while in goat there were two species of lice; sucking lice *Linognathus spp.* and biting lice *D. capri* (Fig. 3 a,b). Sheep was highly infested with *D. ovis* (76.2%) while *Linognathus spp*. infestation was (16.9%) and the mixed infestation was (6.7%) (Table 5 and Fig.2, c,d). Moreover, goats were infested with *Linognathus spp.* (78.3%) and (14.1%) *D. capri* was while mixed infestation was (7.4%) (Fig. 3, c).

Discussion

Lice are considered permanent ectoparasites highly host specific and belonging to order Phthiraptera which included Anoplura Rhynchophthirina, Ischnocera and Amblycera. Anoplura known as sucking louse, are exactly blood feeders which require multiple portions of feeding every day causing notable economical loss such as anaemia and skin damage [10]. The veterinary importance lies not only on causing damage through their bites but also in their capability of transmitting some agents. The aim of the current study is to update the epidemiological data and associated risk factors of lice infestation in sheep and goats. The total infestation rates were (50.43%) and (57.02%), in sheep and goats respectively. These infestation rates are somewhat high and significant and multiple infestation with biting and sucking lice was very common, however, it is important to highlight that the infestation of sheep by *D. caprae* and *L. africanus* is due to the coexistence of both ruminant species [11, 12] and this indicates that there is a real problem, in goats and sheep reared in very close contact and also may be due to lice have the highest prevalence among the ectoparasite types are easily transmitted within populations which is considered as a risk factor for high transmission [7]. This was nearly similar to the findings of Al-Farwachi *et al.* who recorded (63.63%) infestation rate in sheep and 66.66% in goats [13]. However, the study of Meguini *et al*. recorded low infestation rate of (27%) in cattle, (24%) in sheep and (30%) in goats in the Guelma area [14]. Also, in Tunisia, researchers reported an infestation rate of (14.3%) in cattle [15]. The differences and similarities in the infestation rates could be attributed to different causes such as health of animals, diet quality, breeding, rearing conditions during the winter (low ambient temperature, high humidity, poor hygiene, parturition, and deficient feeding) compromise the immunity of animals and presume a more intensive infestation with parasites [16]. The ruminant industry is still facing several health problems. Veterinary authorities, veterinarians and farmers pay more attention to diseases with high morbidity and lethality such as foot and mouth disease, brucellosis or tuberculosis. On the other hand, endemic parasitic diseases such as external parasites, GIT and blood parasite infections, which induce lower losses but may concern a high percentage of the population and may last for several years sometimes the whole life of the animal are often neglected [17]. For instance, animals infested by ectoparasites are not considered sick and they do not therefore receive specific health care. This high prevalence and diverse ectoparasitic infestations that eventually caused significant economic losses, thus proper control measures should be adopted to manage these ectoparasites [18].

A study in Mosul by Kakabwa *et al.* recorded infestation rates (11.8%) and (6.7%) in goats and sheep respectively which is too far lower than this study [19]. This high infestation may return to bad management or malnutrition and infection with other viral, bacterial and parasitic infections. High infestation rate in goats compared to sheep is similar to a study in Kurdistan region, Iraq recorded an infestation rate (95%) in goats and (43.23%) in sheep [20]. The same results were reported by Mustafa in Sulaymaniyah contrary to our study who recorded a higher infestation rate in sheep compared to goats [21]. This diversity in infestation could be attributed to geographical climate changes in the studied areas [8]. Add to this is the willingness of farmers to treat their infested ruminants with anti-parasitic and prefer to reared sheep more than goats may be another reason for diversity of infestation.

The study results identified two species of lice infesting sheep; sucking lice *Linognathus* spp. and biting lice *D. ovis*, while in goats there were two species of lice; sucking lice *Linognathus* spp. and biting lice *D. capri*. Sheep was highly infested with *D. ovis* (76.2%) while *Linognathus* spp. infestation was (16.9%) and the mixed infestation was (6.7%). Moreover, goats were infested with *Linognathus* spp. (78.3%) and *D. capri* (14.1%) while mixed infestation was (7.4%). These results coordinate with the findings of [17] who identified two different types of lice *B. caprae* and *L. africanus* and

infestations of *B. caprae* and *L. africanus* have also been reported at various rates in Indonesia [22], Malaysia [11] and India [23].

Lice infestation rates in this study were higher in the winter months January, February and March (60%) in sheep contrary to goats higher (65%) in summer and lower in sheep due to shearing, solar radiation and thunderstorms in sheep vs goat [24]. Pediculosis is heavier during the winter season where intense reproduction occurs with denser coats, stress, malnutrition, and indirectly through transportation of wool tufts by birds [7, 25] in addition to low hygiene practices due to the high number of animals, abiotic factor (hygrometry and temperature) and high animal density in the intensive farm [26]. The highest populations of lice are commonly in winter months and the lowest are recorded during summer months. Heavy infestations of lice occur in cooler skin temperatures and survival of lice favors cooler weather and denser winter coat. Well-fed healthy cattle do not develop heavy lice infestation and lice present do not affect performance seriously [25, 27]. Also, heavy pediculosis occurs in poor cattle conditions, particularly if they are infected with chronic disease. These highly susceptible animals to lice infestation are called "louse carriers". In addition, the greasiness of the hair coat in various cattle breeds also is considered another important factor which increased susceptibility to infection. However, lice burden differences differ according to many reasons like immune, nutrition and health state between animal's individuals, breed, rearing system and healthier condition are the major risks affecting the incidence and spreading of lice among goats [15, 26, 28]. Lice are seen externally on animal skin, and their life cycle is confined to the animal's body surface and transmission occurs only by direct physical contact [29]. Agroclimatic region, breed, immune status, system of rearing and hygiene are the major factors affecting the prevalence and distribution of lice among goats [30].

The infestation rate according to age, our study revealed no significant differences between age groups in sheep less than 3 and more than 3 years (49.62%), (51.46%) respectively, while in goats revealed that age groups more than 3 years recorded higher infestation rates with lice (71.76%) compared to less than 3 years (39.53%) respectively. Our results agree with Smith and Sherman who recorded 40.8% in adult sheep and the lowest (22.6%) in young age [28]. Contrary to our results Iqbal *et al.* recorded the highest infestation in small ruminants (50.5%) while in adults (39%) [31].

Our results related to sex revealed a significant advanced lice infestation ratio in females of goats and sheep (68.97%), (76.6%) respectively. This is attributed to the number of animals reared and keeping females for meat and milk production contrary to cattle which is bred for meat production. These results do not match with [28] who recorded (38.2%) and (33.8%) in males and females of sheep respectively. While similar results are found [30] reported (16.9%) in male and (20.5%) in female sheep.

Results of the breed as a risk factor recorded no significant differences between local and foreign breeds in sheep while goats recorded (64%) higher in local breed compared with Afghani and Shami breeds (54.16%) and (50%) respectively. Contrary to our results, a study by Sarfraz *et. al.,* 2023 mentioned that there was no statistical deference ($p>0.05$) between the prevalence of any of the ectoparasite infestation with age, sex and body condition score [18].

The infestation rate as shown in this study reported significant differences in different areas inside and outside Mosul city depending on the geographical distribution, number and type of animals, environment and type of management. In sheep, the highest infestation rates were in Al-Shura, Qayyarah and Al-Mahalabiya (55%), (53.84%) and (52.63%) respectively and the lowest in Nineveh Plain (40%). In goats the highest infestation ratio was recorded near Bazwaya then City Center while lower in Cojjali 88.33% 61.33% and 47.3% respectively. These differences in rates with different areas in the same animal type are due to management and environmental conditions.

According to the feeding system in sheep and goats, this study showed that the infestation rate differs. In sheep, indoor feeding recorded a higher infestation rate (55.71%) compared with sheep following outdoor feeding (42.55%). This may be due to close contact between animals specially in winter and crowded barns. While in goats, outdoor feeding recorded higher infestation rate (69.16%) compared with (52.5%) with indoor feeding with significant differences at $p\leq0.05$. This may be due to physiological behaviour and the type of hair and fleece of animals. Al-Saffar and Muhammad considered goat pediculosis as a main insect problem in goats kept under the feeding system, especially during winter months [32].

The current study also identified the lice species infesting ruminants. In sheep, the study identified both types of lice sucking lice (*Linognathus* spp. 16.9%) and biting lice (*D. ovis* 76.2%), while in goat; sucking lice (*Linognathus* spp. 78.3%) and biting lice (*D. capri* 14.1%). In Mosul similar findings were recorded by Kakabwa *et al.* where *L. stenopsis* and *D. caprae* were recorded in goats, while *D. ovis* in sheep [19]. The mixed infestation was higher in goats

(62%) than in sheep (28%) and mixed infestation in sheep was (6.7%) while in goat (7.4%). The main clinical signs in infested goats and sheep include pale mucus membrane, emaciation, tachycardia, anorexia and itching. A study investigated by Zangana *et al.* in Kurdistan-Iraq sheep were infested with the (35.58%) blue lice *L. africanus* and (24.11%) with *D. ovis* [20] and in goats, 80% *D. caprae* and (30%) *L. africanus.* Another study evaluated by Pols and Mawlood [33] in Iraq also reported five species of sheep lice in Mosul of which (0.2%) *L. africanus* and (6.4%) *D. ovis*. whereas other researchers described presence of sheep infestation with (75%) of *D. ovis* while (33 %) with *L. stenopsis* while goats were infested with (80%) and (19%) respectively [21]. Also, Brown *et al.* [24] reported prevalence of two lice *D. ovis* (17.7%) and *L. stenopsis* (13.6%), and two species of goat, *D. caprae* (10.9%) and *L. stenopsis* (6.2%). A morphological study of goat external parasites in Erbil - Iraq, diagnosed *D. caprae* and *L. africanus* lice [33].

Infested ruminants do not show clinical signs, mainly when the level of infestation is low. While in heavy infestation pruritus in 63% of the infested ones, which sometimes induced a depilation observed in 37% of these calves [34]. Ruminants can also be exposed to infestation with *Linognathus* spp. sucking lice. Haematophagous blue lice, *L. africanus* can infest various locations on the body especially the neck and the back of sheep and goats [34]. Lice cause itching actions in the host causing the host to rub, scratch, and bite skin which indirectly decreases the quality of hair and the wool [35].

Conclusion

The current study revealed that the lice infestation in ruminants is significantly high especially in goats (57.02%) while in sheep was (50.43%). Sheep were infested with two species of lice; sucking lice *Linognathus* spp. and biting lice *Damalina ovis*. While goats were infested by both species of lice; sucking lice *Linognathus* spp. and biting lice *Damalina capri*. Sheep were highly infested with *Damalina ovis* (76.2%) followed by *Linognathus spp.* (16.9%) and mixed infection was (6.7%). The infestation rate with *Linognathus spp.* in goats was (78.3%) and with *Damalina capri* was (14.1%) while mixed infested rate was (7.4%). In sheep, the winter season recorded the highest infestation rates while summer season recorded the lowest infestation rates. Moreover, goats recorded the highest infestation rate in summer. Ages more than three years recorded a higher infestation rate. Location and feeding system were not significant factors for pediculosis. More epidemiological studies are needed regarding the distribution and understanding of lice in Mosul city. Morphological identification is complex and confined to the genus of lice. Therefore, molecular level is very important to evaluate and offer proper treatment and control. In addition, our findings indicated risk factors as season, age, breed, sex, feeding system and location give critical information for pediculosis.

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Declaration of Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical of approval

The institutional animal care and use committee in the College of Veterinary Medicine, University of Mosul, ethically permitted this study (UM.VET.2022.088) on 15/7/2022.

TABLE 1. Total infestation rate of lice in small ruminants

Animal species	No. of examined animals	No. of infested animals	Percentage
Sheep	1170	590	50.43% [a]
Goat	470	268	57.02% [b]

[A,b] The different letters between groups mean there is a significant difference at $p \leq 0.05$.

TABLE 2. Infestation rates of sheep lice according to risk factors

Risk factors		No. of examined animals	No. of infested animals	Percentage
Months	Jan., Feb., Mar.	300	180	60% [a]
	Apr., May, Jun.	350	190	54.3% [b]
	Jul., Aug., Sep.	250	100	40% [c]
	Oct., Nov., Dec.	270	120	44.4% [c]
Age	Less than 3 years	655	325	49.62%
	More than 3 years	515	265	51.46%
Sex	Male	590	190	32.20%
	Female	580	400	68.97 % *
Breed	Local	665	335	50.5% [a]
	Turkish	300	150	50% [a]
	Iranian	205	105	51.21% [a]
Location	Al-Mahlabiya (Sitta)	475	250	52.63% [b]
	Bazwaya	130	60	46.15% [a]
	Gogjali	150	70	46.66% [a]
	Qayyarah	65	35	53.84% [b]
	Nineveh Plain	50	20	40% [a]
	Al-Shura	100	55	55% [b]
	Tubzawa	100	50	50% [b]
	Tirawa	50	25	50% [b]
	Tuwaitla	50	25	50% [b]
Feeding system	Indoor feeding	700	390	55.71% *
	Outdoor feeding	470	200	42.55%
Total		1170	590	50.43%

[A,b,c] Different letters among groups at $p \leq 0.05$ mean the differences are significant.

[*] Means significant differences is found between groups.

TABLE 3. Infestation rates of goat lice according to risk factors

Risk factors		No. of examined animals	No. of infested animals	Percentage
Months	Jan., Feb., Mar.	90	53	58.89% [a]
	Apr., May, Jun.	180	90	50% [b]
	Jul., Aug., Sep.	100	65	65% [c]
	Oct., Nov., Dec.	100	60	60% [a]
Age	Less than 3 years	215	85	39.53%
	More than 3 years	255	183	71.76% *
Sex	Male	235	88	37.45%
	Female	235	180	76.60% *
Breed	Local	200	128	64% [a]
	Afghani	120	65	54.16% [b]
	Shami	150	75	50% [b]
Location	City centre	150	92	61.33% [a]
	Gogjali	260	123	47.3% [b]
	Bazwaya	60	53	88.33% [c]
Feeding system	Indoor feeding	350	185	52. 5%
	Outdoor feeding	120	83	69.16% *
Total		470	268	57.02%

[A,b,c] Different letters among groups at $p \leq 0.05$ mean the differences are significant.

[*] Means significant differences is found between groups.

TABLE 4. Prevalence of lice species infesting sheep.

Species	No. of infested animals	Percentage
Linognathus spp.	100	16.9%
Damalina ovis	450	76.2%
Mixed infestation	40	6.7%
Total no.	590	

TABLE 5. Prevalence of lice species infesting goats.

Species	No. of infested animals	Percentage
Linognathus spp.	210	78.3%
Damalina capri	38	14.1%
Mixed infestation	20	7.4%
Total no.	268	

Fig. 1. (a), (b) Eggs of lice (nests) in goat (c), (d) Infestation of *Linognathus spp.* (sucking lice in goat).

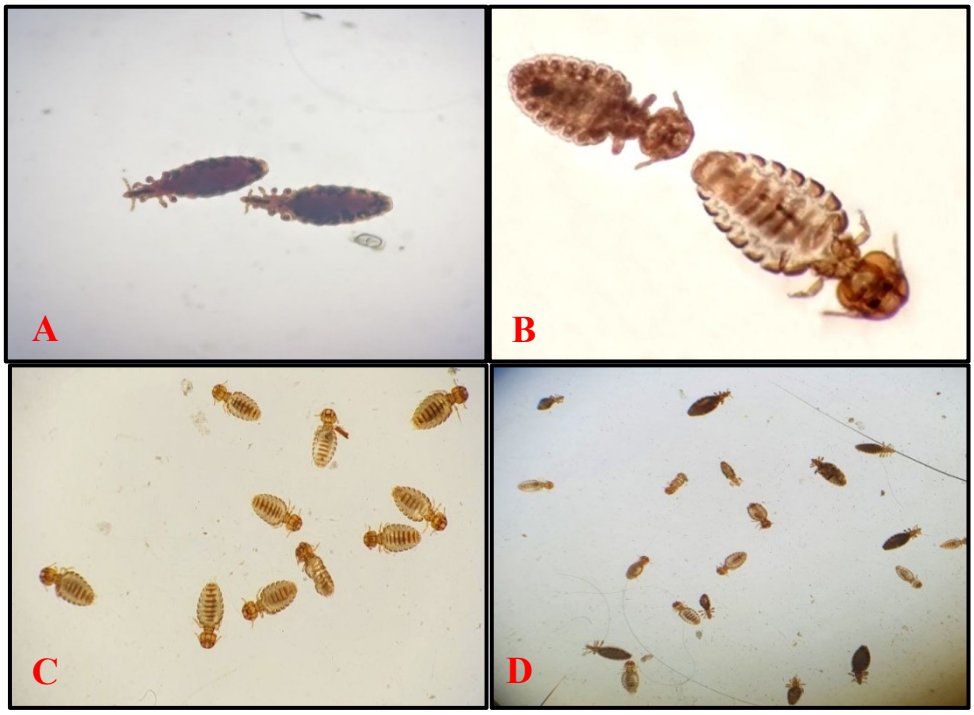

Fig. 2. (a) Sheep sucking lice *Linognathus spp*. 25X. (b): Sheep biting lice *Damalina ovis* 25X. (c and d): Mixed infestation of lice in sheep and goat 10X.

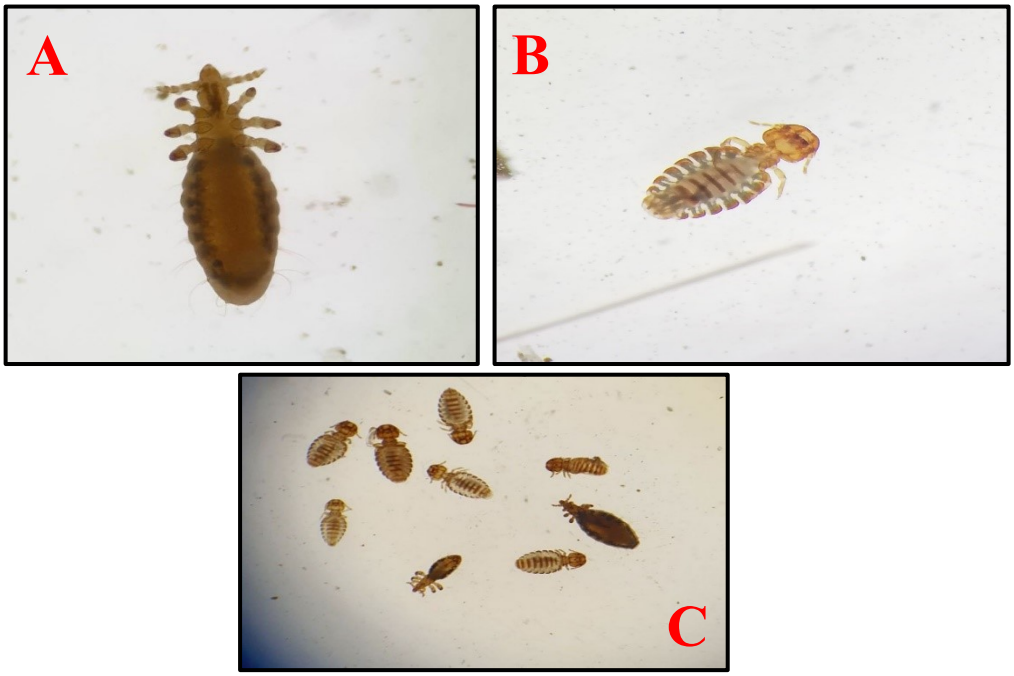

Fig. 3. (a) *Linognathus stenopsis* (sucking lice in goat) 25X. (b) Goat biting lice *Damalina capri* 25X. (c) Mixed infestation of lice in goat 10X.

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دراسة انتشار الاصابة بالقمل في الأغنام والماعز وعلاقته بعوامل الخطورة في مدينة الموصل – العراق

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الملخص

التقمل هي واحدة من أهم المشاكل الطفيلية البيطرية التي تسبب خسائر اقتصادية. هدفت الدراسة إلى تقييم مدى انتشار وبعض عوامل الخطورة للإصابة للقمل في الاغنام والماعز. أجريت الدراسة خلال الفترة من كانون الثاني 2022 حتى كانون الاول 2022. تم فحص 1170 من الأغنام و470 من الماعز. وكانت نسب الإصابة الكلية أعلى في الماعز (57.02٪) مقارنة بالأغنام (50.43٪). أظهرت الدراسة أن الأنواع التي تصيب الأغنام كانت .*Linognathus* spp و *Damalina ovis* (*D. ovis*)، بينما في الماعز كان هناك نوعان من القمل، *Linognathus stenopsis* و (*L. stenopsis*) و *Damalina capri* (*D. capri*). كان أعلى معدل إصابة في الأغنام مع *D. ovis* (76.2٪) بينما في *Linognathus* spp. (16.9٪) والإصابة المختلطة (6.7٪). كان معدل الإصابة بـ .*Linognathus* spp في الماعز (78.3 ٪) ومع *D. capri* كان (14.1 ٪) بينما كان معدل الإصابة المختلطة (7.4 ٪). في الأغنام. تم تسجيل أعلى نسبة إصابة خلال أشهر شتاء وبنسبة (60٪)، بينما اقل نسبة إصابة خلال أشهر الخريف (40٪). لا توجد فروقات معنوية بين الفئات العمرية والسلالات المحلية والأجنبية. وكانت هناك فرق معنوي بين الذكور(32.2%) والإناث (68.97كانت أعلى نسب اصابة وفقا لمناطق الدراسة الشورى (55٪)، بينما سجلت أقل نسب في سهل نينوى (40٪). أما عامل التغذية، فقد أظهرت النتائج أن نظام التغذية الداخلي أعلى نسبة من نظام التغذية الخارجي وسجلت (55.71٪). اما فيما يخص الماعز، تم تسجيل أعلى نسبة إصابة خلال الصيف (65٪)، بينما تم تسجيل أقل نسبة إصابة خلال أشهر الربيع (50٪). سجلت الفئة العمرية أكثر من 3 سنوات معدل إصابة (71.76٪) مقارنة بـ 39.53٪) للفئة العمرية أقل من 3 سنوات كان أعلى معدل إصابة (76.6٪) في الإناث مقارنة بـ (37.45٪) في مجموعة الذكور. اعلى نسبة اصابة سجلت في السلالات المحلية (64٪) مقارنة بالسلالات الأجنبية. سجلت منطقة بازوايا أعلى نسبة إصابة (88.33٪). نظام التغذية الخارجي (69.16٪) أعلى من نظام التغذية الداخلي (52.5%). أظهرت نتائج الفحص العياني وجود قمل وبيوض في جلد الماعز مع التهابات شديدة تظهر الشعر التالف وبقع تساقط الشعر بسبب الإصابة الشديدة. أظهرت هذه الدراسة أن القمل هو الطفيلي الخارجي السائد الذي يصيب الأغنام والماعز مما يسبب تلفا في الجلد وبالتالي خسائر اقتصادية فادحة.

الكلمات الدالة: القمل - الماعز- الاغنام - الطفيليات الخارجيه.