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Prevalence of Bovine Fascioliasis by Traditional Techniques in Nineveh Governorate, Iraq

Article Info.

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Abstract

The study was conducted to evaluate the prevalence of Fasciola Nineveh governorate, Iraq. The study took place between A February 2025. Examination of faecal samples was carri sedimentation techniques to identify the Fasciola spp. eggs. Ac spp. eggs were found in 12.50% of the feaces of 200 examined c significant incidence of Fascioliasis infection between male notable differences were observed concerning infection Furthermore, there was a significant difference between clini suspected infection in cattle. The highest infection rates were re the market of cattle while the lowest rates were recorded in highest infection rates were recorded during October and temperature during this period, which is ideal for egg hatching, ponds and aquatic plants especially in the rainy season. The lowe August, January and February. The average egg dimensions 139.42 × 81.34 microns (length × width).

Key Words: *Fasciola* egg, Prevalence, Cattle, Nineveh governorate
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Introduction

Fascioliasis is a serious parasitic disease transmitted through food and water contaminated with metacercariae, affecting between 2.6 and 18 million people and more than 300 million domestic ruminants in tropical or subtropical regions (1). The trematode species *Fasciola gigantica* and *Fasciola hepatica*, which cause fascioliasis, seriously threaten many domestic animals, especially ruminants such as sheep and cattle (2). Climate change and human-induced environmental changes are two factors contributing to the daily increase in fascioliasis cases (3). *F. hepatica* is widespread in temperate Eurasian countries, including Turkey, Austria, and Italy, as well as in American countries such as Brazil, Argentina, and Mexico, where cattle are the primary host. However, they are common in tropical environments (4, 5). Conversely, *F. gigantica* is widespread throughout Asia and Africa. The geographic distributions of these parasites may overlap, especially in tropical regions (6, 7). Areas such as Egypt, Armenia, Niger, Algeria, South Africa, and Iran have documented the presence of *F. gigantica* and *F. hepatica* in cattle (8). Both species cause liver dysfunction, primarily resulting in high rates of morbidity and mortality, impair growth, reproductive problems, and ultimately reduce animal production (9). This disease causes significant losses and requires liver inspection in slaughterhouse assessments (10).

Fascioliasis can cause acute and chronic forms; the chronic form is more often seen in cattle and includes serious liver damage, anemia, weight loss, icterus, and eventually subcutaneous swelling revealed as known bottle jaw (11). Furthermore, untreated animals may die from the disease. Conversely, hepatomegaly and the development of hemorrhagic lesions in the liver indicate the acute form. In rare cases, liver flukes may invade the abdominal cavity, lungs, eyes, lymph nodes, and subcutaneous tissue (12, 13).

The simplest diagnostic methods for Fasciola spp. infection involve detecting the eggs in the feces of infected animals, especially in chronic cases, and have been widely used in many studies, despite their significant impact. Fasciola spp. eggs are large, oval-shaped, and yellowish-brown in colour, and they have an operculum. This study aimed to identify and diagnose Fasciola spp. eggs in cattle fecal samples and determine their prevalence in the Nenevah governorate, Iraq.

Materials and Methods

Ethical approve: All methods and procedures used in a recent study were completed according to the Scientific Ethical Committee on Animal Experimentation guidelines at the College of Veterinary Medicine, University of Mosul, UM.VET.2024.030.

Collection of samples and laboratory investigation: Fecal samples were collected directly from the rectum of 200 cattle using specialized tools, and each sample was tagged to indicate the date, age, and sex of each cattle. The animal's age was determined using owner data. The cattle were classified into two age categories: young (< 2 years) and adult (> 2 years) (14). The samples were

analyzed at the Parasitology Laboratory in the College of Veterinary Medicine, University of Mosul.

The analysis of fecal samples was conducted using the direct method and sedimentation technique to identify the presence of Fasciola eggs (15, 16). To diagnose the eggs of the fasciola species that exist in feces, samples were examined under a Light Microscope. *Fasciola hepatica* egg is measured 63-90 x 130-150 microns while *Fasciola gigantica* egg is similar to *Fasciola hepatica* but is larger, measuring 90-104 x 156-197 microns according (17)**,** therefore, to confirm the egg size, the dimensions (length × width) of the detected eggs in the fecal samples were measured using an ocular micrometer (18, 19).

Statistical analysis: Chi-square was used at a significance level of $P \leq 0.05$ (21).

Results

The study, which examined 200 fecal samples collected from different areas of Nineveh governorate, showed that the infection rate was **12.50%**. The study results indicated that the highest rate of infection was in females, reaching 20 samples, representing 14.9%, while the rate in males was 7.57% as shown. Regarding the relationship between the infection rate and the age of the cattle, the highest infection rate was found in cattle > 2 years. old compared to ≤ 2 years. old, reaching 17.79%, while the rate in cattle ≤ than two years was 4.87% with a significant difference. The study results showed that the highest rate of *Fasciola* spp. egg infection was in cattle suffering from clinical signs such as emaciation, loss of appetite, dehydration, and rough hair, which were the most common symptoms, reaching 18.82%. *Fasciola* spp. eggs were also detected in fecal samples from clinically healthy cattle, accounting for 7.82% of the cases with a significant difference as shown in Table (1) and Bar gGaph (1).

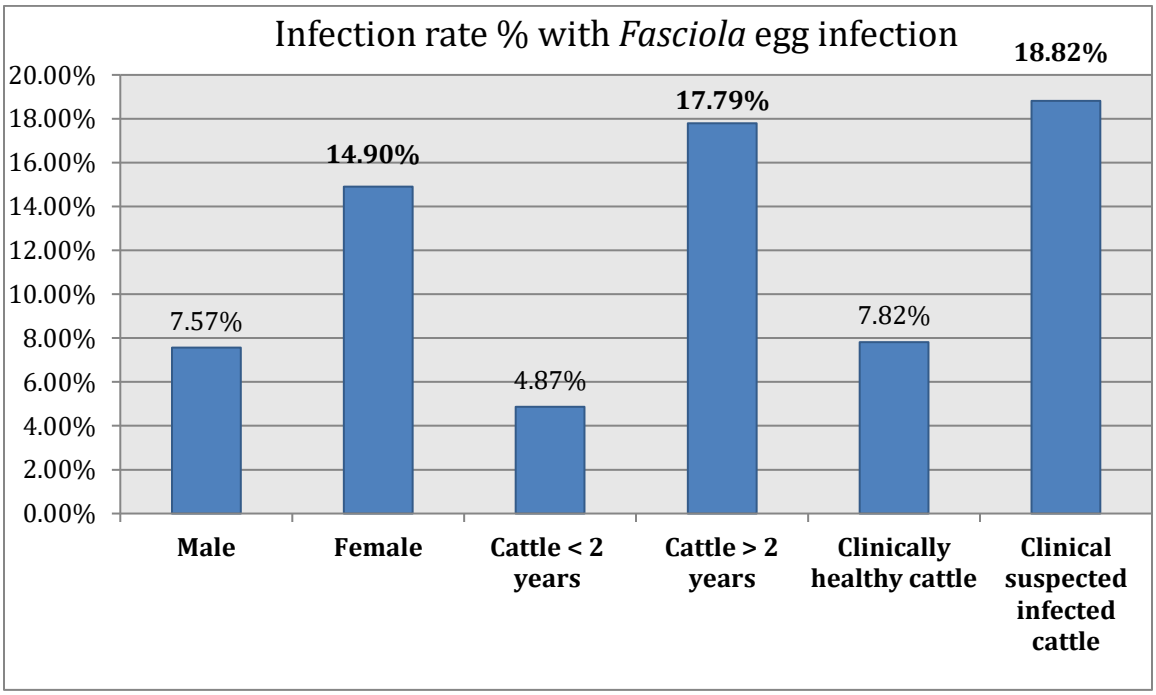
Regarding the relationship between infection and the study months, the highest infection rates occurred during October and November, reaching 30% and 24%, respectively. The lowest rates occurred during August, January, and February, reaching 0%, 3.3%, and 8%, respectively. Statistically significant differences were observed between August and September and October and November, while there was no significant difference between August and December and January and February. Significant differences were also observed between October and January, and there was also a significant difference between November and January at a significance level of $P < 0.05$ as shown in Table (2) and Bar Graph (2).

Regarding the relationship between infection and the study area, the highest infection rates occurred in Hammam al-Ali and the market of Cattle, reaching 27.7% and 15%, respectively. The lowest rates occurred in Bashiqa and Kokjla, reaching 6.6% and 7.54%, respectively. The relationship between the prevalence and the study area samples, with no significant differences among the areas, as shown in table (3)

Table (1) Infection rate according to some factors related to the examined fecal samples from cattle:

factors		NO. of examined samples	NO. of Positive samples	Rate of infection %	Statistical analysis
Sex	**Male**	66	5	7.57% a	0.187
	Female	134	20	14.9% a	
Age of cattle	**≤ 2yrs.**	82	**4**	**4.87% a**	0.015
	> 2yrs.	118	**21**	**17.79% b**	
Clinically healthy cattle		115	9	**7.82% a**	0.416
Suspected infected cattle		85	16	**18.82% a**	
Total		200	25	**12.50%**	-

Different litters mean significant differences at P < 0.05

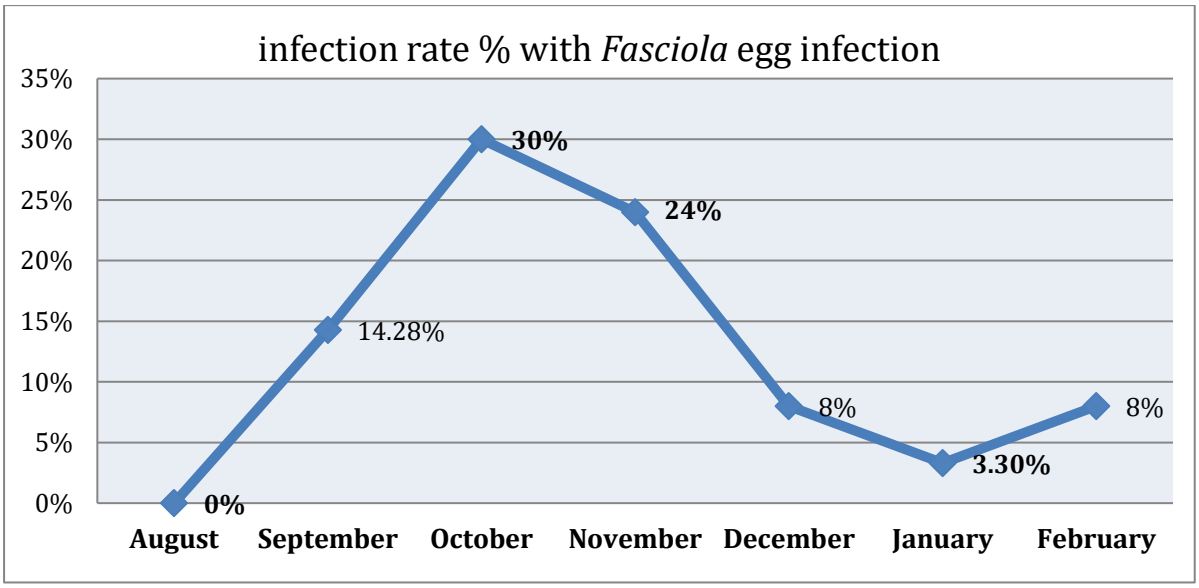


Bar Graph (1) indicates the infection rate according to factors related to the animal.

Table (2) illustrates the relationship between infection rate and the months of study:

Months of study	No. of examined samples	No. of positive samples	Infection rate %
August	30	0	0% a
September	35	5	14.28% b
October	30	9	30% bc
November	25	6	24 % bd
December	25	2	8 % ab
January	30	1	3.30% abdf
February	25	2	8 % abc
Total	200	25	12.5%

Different litters mean significant differences at P ≤ 0.05.



Bar Graph (2) indicating the rate of infection according to study months.

The eggs of *Fasciola* species were described with measurements approximately the average (length × width) was 139.42+11×81.34+9 µm, with standard deviation (SD) and ranging (length/width) from 122.4-156/64.5-96 µm for estimated eggs with ocular micrometer; table (4) and fig. (2).

Table (3) illustrates the correlation of prevalence in the studied regions:

Study areas	NO. of examined samples	NO. of positive samples	Infection rate %
Kokjla	53	4	7.54 a
Hammam al-Ali	18	5	27.7 a
Bashiqa	30	2	6.6 a
Bartella	15	2	13.3 a
Shallalat	24	3	12.5 a
Cattle market	60	9	15 a
Total	200	25	12.5 a

Similar litters mean no significant differences at P < 0.05

Table (4) shows the dimensions of the *Fasciola* eggs detected in cattle feces:

NO. of estimated eggs	Average±SD (microns)		Range (microns)	
	length	width	length	Width
25	139.42±11.0	81.34±9.005	122.4-156	64.5-96

The eggs of *Fasciola* species, which were diagnosed in the study, were found in the infected cattle feces added in Fig. (1). The examined eggs were observed to be large, oval, and yellow-brown; had a thin shell; were non-embryonated; and had prominent operculum Fig. (1).

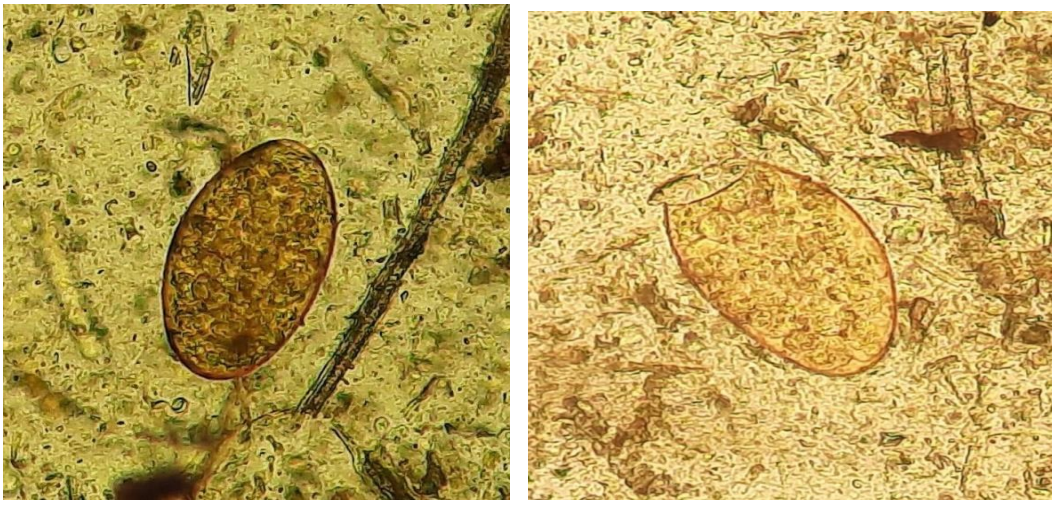


Fig. (1). Eggs of *Fasciola* spp. were detected in cattle feces, which were examined by direct and sedimentation methods (Light Microscope, under power 10X). Red raw is marked to the operculum.

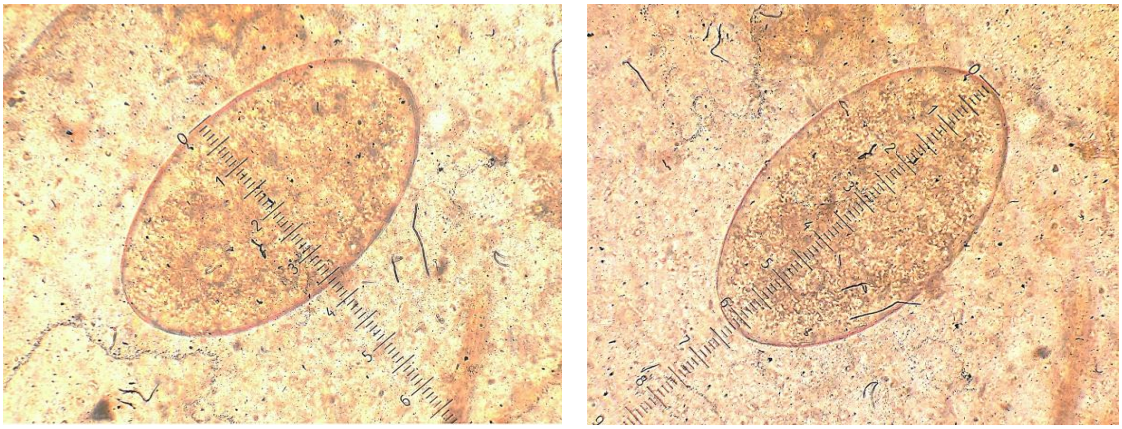


Fig. (2) Dimensions of *Fasciola* spp. eggs were estimated with an ocular micrometer (Light Microscope, under the power 40X).

Discussion

In Iraq, the natural climate, such as wetlands, river canals, and heavy irrigation, and the snails (IH), in addition to continuously importing livestock from neighboring countries and far regions due to economic demands, raise the possibility of spreading the disease (21). However, how common the disease depends on several factors, including how many samples were tested, the weather in each area, how much contact there is with the snails, and how the animals are managed and treated, which all help explain the differences in *Fasciola* spp. infection rates (22). The morphological and morphometric results indicated that the identified positive fecal samples were *Fasciola* species eggs.

In this study, we found that 12.50% of the samples had fasciolosis based on fecal examination, which is close to the 12.30% found in cattle by (23) but lower than the 17.4% reported for *Fasciola* spp. eggs in cattle feces (24). This difference might be caused by variations in yearly rainfall, which can help *Fasciola spp.* and its snail host survive better in some environments while making it more challenging in others (25). It may also be due to seasonal differences in which these different studies were conducted in different areas of Nenevah (26).

In our study, there was no significant difference in prevalence observed in females and males with $P < 0.05$, similar to the study carried out by (23). This information is consistent with the reports of other studies (27). This may be due to the females remaining more than the males due to slaughtering purposes (28), while domestic animals' male and female sexes were both exposed to the same risk factors for infection, such as contaminated grass (29).

The prevalence between the ages of cattle in our study was 17.79% in those more than 2 years old, while in those equal to or less than 2 years old, it was 4.87%, with a significant difference of $P < 0.05$, similar to (23). This relationship between the prevalence of *Fasciola* spp. egg infection and the age of animals differ from findings in (27). The study by (30) revealed that the infection was higher in animals under one year of age (62.7%) and lower in those between one and four years of age (23.2%). Furthermore, the infection in the animals under one year old was more than in those above five years old. (21) The study reported no significant difference between the infection rate and age. (31) It has been stated that the increase in the infection rate of Fasciola in young animals may be due to underdeveloped immunity. In contrast, older animals have grown accustomed to Fasciola infection and have thus established a certain level of immunity.

The study results showed that the highest rate in clinically suspected infection reached 18.82 %, and clinically healthy cattle were 7.82% with no significant difference. According to the study (31), a prevalence of 19.26% and 12.45% was observed in animals of poor and good body conditions, respectively.

The higher infection rate was in October, while no prevalence was observed in August. In contrast with the study (32), prevalence was observed to be slightly higher during the wet season from August to December (50–58%) than during the dry season from January to June (30–45%).

In our study, the eggs were measured, approximately averaging 139.42 x 81.34 µm, which is close to the study of (33) that the average was 140.2 x 83.4 µm (eggs of *Fasciola* in cattle/Georgia). In comparison, the estimated eggs of *F.hepatica* were measured at approximately 150 x 90 µm, whereas those of *F. gigantica* measure around 190 x 100 µm (34). Also, we are different from the study (35) which was 155.61 x 86.27 µm of *Fasciola* species egg.

Conclusion

It is necessary to conduct periodic examinations of cattle feces samples, especially in suspected regions, to ensure the presence of Fasciola parasite eggs, to carry out treatment steps, and to control the disease caused by the *Fasciola* species.

Conflicts of interest

The authors declare that there is no conflict of interest.

Ethical Clearance

This work is approved by The Research Ethical Committee.

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انتشار حلزون الكبد في الأبقار بطرائق التقليدية في محافظة نينوى، العراق

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الخلاصة

أجريت الدراسة لتقييم معدل انتشار عدوى الطفيلي حلزون الكبد في الأبقار في محافظة نينوى بالعراق خلال الفترة من شهر آب 2024 إلى نهاية شهر شباط 2025. تم فحص عينات البراز من خلال تقنيات مباشرة وتقنيات الترسيب لتحديد بيض حلزون الكبد. وفقًا للبيانات، تم العثور على بيض حلزون الكبد **12,50٪** في براز من **200** أبقار المفحوصة. في الدراسة، لم تكشف عن وجود نسبة كبيرة من الإصابة بداء حلزون الكبد بين الذكور والإناث؛ ومع ذلك، لوحظت اختلافات ملحوظة فيما يتعلق بمعدلات الإصابة بين الفئات العمرية. علاوة على ذلك، كان هناك فرق كبير بين الإصابة السليمة سريريًا والمشتبه بها سريريًا في الأبقار. تم تسجيل أعلى معدلات الإصابة في حمام العلي وسوق الأبقار بينما تم تسجيل أدنى المعدلات في بعشيقة وكوكجالي. تم تسجيل أعلى معدلات الإصابة خلال شهري تشرين الاول و تشرين الثاني بسبب درجة الحرارة المثلى خلال هذه الفترة، وهي مثالية لتفقيس البيض، علاوة على ذلك في المناطق التي بها برك ونباتات مائية وخاصة في موسم الأمطار. سُجِّلت أدنى المعدلات خلال أشهر آب وكانون الثاني وشباط . وبلغ متوسط أبعاد من البيوض المقدرة كانت **139,42** × **81,34** ميكرون (الطول × العرض).

الكلمات المفتاحية: بيض حلزون الكبد، الانتشار، الأبقار، محافظة نينوى.