

## Detection of *Fasciola sp.* in the Livers of Slaughtered Cattle at a Slaughterhouse in North Lombok Regency

### Deteksi *Fasciola sp.* pada Hati Sapi Potong di Rumah Potong Hewan di Kabupaten Lombok Utara

Syamsuddin<sup>1</sup>, Novarina Sulsia Ista'in Ningtyas<sup>1</sup>, Ni Luh Lasmi Purwanti<sup>1</sup>, Supriadi<sup>2</sup>

<sup>1</sup>Division of Veterinary Anatomy and Pathology, Faculty of Veterinary Medicine, Mandalika Education University, Mataram-Indonesia

<sup>2</sup>Division of Veterinary Parasitology, Faculty of Veterinary Medicine, Mandalika Education University, Mataram-Indonesia

#### ABSTRACT

**Background:** *Fasciola sp.* has been identified as a highly pathogenic organism and has a significant health impact on both animals and humans. However, there is a lack of data and information on fasciolosis in North Lombok Regency. **Purpose:** This study aims to detect the presence of *Fasciola sp.* in livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency. **Methods:** This study was conducted on the livers of slaughtered cattle, with a total of 30 samples collected between August and September 2023. **Results:** A total of 30 liver samples from slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency were examined for the presence of *Fasciola sp.* worms. The examination involved observing changes in color, size, consistency, and palpation of the organ. Following the incision of the liver and bile ducts and subsequent inspection of several areas with pathological-anatomical changes due to the infestation of *Fasciola sp.*, an average length and width measurements of *Fasciola sp.* worms were found to be 26 mm and 6.4 mm, respectively. This indicated the worms belong to the *Fasciola gigantica* species. **Conclusion:** The results of this study indicated that *Fasciola sp.* worms were found in the livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency. The worms were identified as belonging to the *Fasciola gigantica* species, characterized by an average length of 26 mm and width of 6.4 mm, having a narrow shoulder, a blunt posterior end, a flat leaf-like body shape, dorsoventrally flattened, a brownish-gray color, and an oral sucker at the anterior end.

#### ABSTRAK

**Latar Belakang:** *Fasciola sp.* telah diidentifikasi sebagai organisme yang sangat patogen dan memiliki dampak kesehatan yang signifikan pada hewan dan manusia. Namun, terdapat kurangnya data dan informasi tentang fasciolosis di Kabupaten Lombok Utara. **Tujuan:** Penelitian ini bertujuan untuk mendeteksi keberadaan *Fasciola sp.* pada hati sapi potong di Rumah Potong Hewan Kecamatan Tanjung, Kabupaten Lombok Utara. **Metode:** Penelitian ini dilakukan pada hati sapi yang disembelih, dengan total 30 sampel dikumpulkan antara Agustus dan September 2023. **Hasil:** Sebanyak 30 sampel hati dari sapi potong di Rumah Potong Hewan Kecamatan Tanjung, Kabupaten Lombok Utara diperiksa keberadaan cacing *Fasciola sp.* Pemeriksaan melibatkan pengamatan perubahan warna, ukuran, konsistensi, dan palpasi organ. Setelah sayatan hati dan saluran empedu dan pemeriksaan selanjutnya dari beberapa daerah dengan perubahan patologis-anatomi karena infestasi *Fasciola sp.* Pengukuran panjang dan lebar rata-rata cacing *Fasciola sp.* ditemukan masing-masing 26 mm dan 6,4 mm. Ini menunjukkan cacing milik spesies *Fasciola gigantica*. **Kesimpulan:** Hasil penelitian ini menunjukkan bahwa cacing *Fasciola sp.* ditemukan pada hati sapi potong di Rumah Potong Hewan Kecamatan Tanjung, Kabupaten Lombok Utara. Cacing diidentifikasi sebagai milik spesies *Fasciola gigantica*, ditandai dengan panjang rata-rata 26 mm dan lebar 6,4 mm, memiliki bahu sempit, ujung posterior tumpul, bentuk tubuh seperti daun datar, punggung pipih, warna abu-abu kecoklatan, dan pengisap oral di ujung anterior.

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**\*Correspondence:**

Syamsuddin

E-mail: [syam48618@gmail.com](mailto:syam48618@gmail.com)

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## INTRODUCTION

Cattle represent one of the most significant livestock species, contributing to a substantial proportion of global meat, milk, and leather production. In Indonesia, beef consumption has reached an all-time high over the past decade, reaching 0.010 kg per capita per week in 2022 (Statistics Indonesia, 2023). Nevertheless, the growing human population necessitates the development of the livestock sector, including the implementation of preventive measures to combat livestock diseases, as these diseases can be economically detrimental and have the potential to be transmitted to humans.

West Nusa Tenggara is one of Indonesia's primary livestock production areas. The region's geographical setting is characterized by a tropical climate with high temperatures and humidity ranging from 65% to 68% (Wariata *et al.*, 2019). These conditions can have a significant impact on animal health. Variations in weather patterns can lead to fluctuations in disease prevalence and, in certain conditions, result in high intensity. In conditions of extreme heat and humidity, the disease prevalence, including parasitic infections, can increase (Akoso, 1996). A common disease affecting cattle in West Nusa Tenggara is caused by liver flukes (*Fasciola sp.*), which can also cause a disease in humans (zoonosis) called fascioliasis (Wariata *et al.*, 2019).

*Fasciola sp.* is a hermaphroditic trematode worm parasite that can cause fasciolosis in livestock. This disease has led to significant global economic losses, including livestock deaths, weight loss, and reduced milk production (Charlier *et al.*, 2008). This parasite is also zoonotic, meaning that it can be transmitted to humans, with approximately 2.4 to 17 million people infected (WHO, 2007). The prevalence of this disease is high in various countries, including Australia (81%), Europe (86%), and Asia (69%) (Usib *et al.*, 2014). Indonesia, in particular, has a prevalence of up to 92%. A recent study conducted by Karlina (2017) on Bali cattle in 10 sub-districts of West Lombok Regency involved the examination of 400 fecal samples, with 219 of them (54.25%) found to be infected. The highest prevalence was observed in Narmada Sub-district (63.88%), while the lowest prevalence was observed in Labuapi Sub-district (42.85%). Additionally, a study conducted by Wariata *et al.*, (2019) at six markets in Central and East Lombok revealed the presence of liver flukes (*Fasciola sp.*) in 18 samples taken. The average number of *Fasciola sp.* found in the liver samples ranged from 1.3 to 2.3 worms. Given the high pathogenicity of *Fasciola sp.*, the significant health impact on both animals and humans, and the limited data and information on fasciolosis in North Lombok Regency, this study aims to detect the presence of *Fasciola sp.* in West Nusa Tenggara in general and in North Lombok in particular.

## MATERIAL and METHOD

### Research Site and Design

This study was conducted at the Tanjung Sub-district Slaughterhouse in North Lombok Regency from August to September

2023. This study employed a descriptive approach with a cross-sectional design. The samples were obtained from the livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency.

### Criteria for Examined Livers

The livers of slaughtered cattle obtained from the Tanjung Sub-district Slaughterhouse, North Lombok Regency were examined. Based on their characteristics, including changes in color, uneven coloration, the presence of white spots, the detection of small openings, soft texture, and the presence of mucus on the surface of the cattle liver (Baker, 2007), it was concluded that the livers were suspected to contain *Fasciola sp.* worms. The sample size for this study consisted of 30 samples, calculated using the formula for detecting diseases based on the monthly slaughter count of 90 cattle. In addition, the *Fasciola sp.* worms were measured for length and width using a digital caliper.

### Parasitological Examination

The samples, collected using purposive sampling, were examined macroscopically. This involved observing the condition of the liver organs. Subsequently, the liver and bile ducts with pathological-anatomical changes were sectioned with a thickness of four to five mm using a knife. The surfaces were pressed to detect the presence of *Fasciola sp.* worms. Liver organs exhibiting signs of damage were separated and subjected to microscopic examination for the presence of *Fasciola sp.* and measurement for length and width of the liver fluke. The samples were placed in bottles and a cool box and transported to the Laboratory of the Faculty of Veterinary Medicine, Mandalika Education University.

### Data Analysis

The data were analyzed using a descriptive analysis and are presented in the form of tables and figures. Conclusions were drawn deductively by presenting both general and specific findings.

## RESULTS

### Results of Liver Examination

A total of 30 livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency, were examined in terms of changes in color, size, consistency, and palpation. It was followed by the incision of the liver and bile ducts and subsequent inspection of several areas with pathological-anatomical changes due to the infestation of *Fasciola sp.* The results of examination are presented in **Table 1** and **Table 2**.

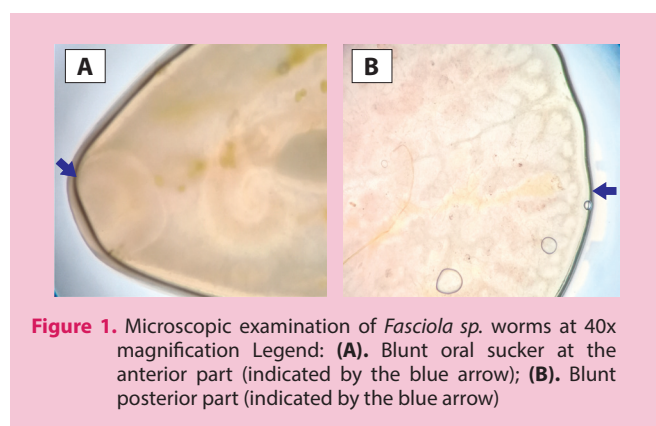
**Table 1.** Results of macroscopic examination of slaughtered cattle livers at the Tanjung Sub-district Slaughterhouse, North Lombok Regency.

Sample Count	Positive	Negative
30	8	22

**Table 2.** Morphological measurements of *Fasciola sp.* from the livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency.

Sample	Average Length	Average Width	Worm Type
Sample 1	27 mm	7.5 mm	<i>F. gigantica</i>
Sample 2	25 mm	6.5 mm	<i>F. gigantica</i>
Sample 3	27 mm	7 mm	<i>F. gigantica</i>
Sample 4	25.5 mm	6.5 mm	<i>F. gigantica</i>
Sample 5	25 mm	7 mm	<i>F. gigantica</i>
Sample 6	26 mm	6 mm	<i>F. gigantica</i>
Sample 7	26.3 mm	6 mm	<i>F. gigantica</i>
Sample 8	26.75 mm	5.25 mm	<i>F. gigantica</i>
<b>Average</b>	<b>26 mm</b>	<b>6,4 mm</b>	<b><i>F. gigantica</i></b>

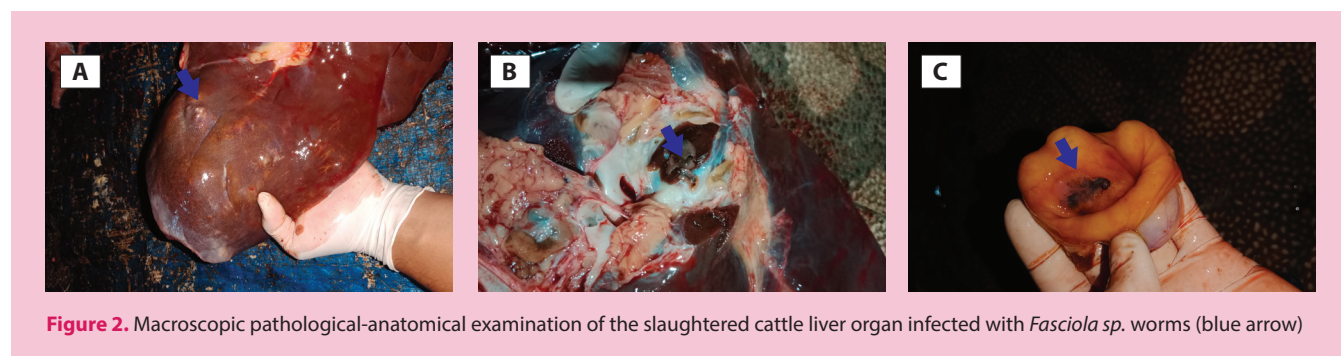
The average measurements of the length and width of *Fasciola sp.* worms found were 26 mm and 6.4 mm, respectively. This suggested that the species belong to the *Fasciola gigantica* species (Baker, 2007).



**Figure 1.** Microscopic examination of *Fasciola sp.* worms at 40x magnification Legend: (A). Blunt oral sucker at the anterior part (indicated by the blue arrow); (B). Blunt posterior part (indicated by the blue arrow)

Based on the morphological examination of *Fasciola sp.* worms macroscopically and microscopically (as shown in Figure 1), the type of liver fluke found in all liver and bile duct samples of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency, was identified as *Fasciola gigantica*. This species had an average length of 26 mm and an average width of 6.4 mm. In addition, this species was brownish-gray in color, had a flattened dorsoventral leaf-like body shape, a narrow shoulder, a blunt anterior part (oral sucker), and a blunt posterior part.

The examination results of the livers of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency, revealed several pathological anatomical-changes in the liver organ, as illustrated in the following images:



**Figure 2.** Macroscopic pathological-anatomical examination of the slaughtered cattle liver organ infected with *Fasciola sp.* worms (blue arrow)

Figure 2 shows the macroscopic pathological-anatomical changes in the liver organ of slaughtered cattle infected with *Fasciola sp.* worms. The liver organ exhibited the following macroscopic changes: (a) the liver of slaughtered cattle infected with *Fasciola sp.* appeared hardened with uneven coloration and paler (indicated by the blue arrow). In (b), *Fasciola sp.* worms were observed within the liver organ (indicated by the blue arrow). In (c), *Fasciola sp.* worms were observed within the bile ducts (indicated by the blue arrow). The morphology of *Fasciola sp.* worms found at the Tanjung Sub-district Slaughterhouse, North Lombok Regency, was characterized by a narrow shoulder, a blunt posterior end, a flattened dorsoventral leaf-like body shape, a brownish-gray coloration, and an oral sucker at the anterior end, which further confirms the presence of the *Fasciola gigantica* species.

### DISCUSSION

The livers of cattle infected with *Fasciola sp.* worms exhibited pathological-anatomical changes, including uneven and paler coloration, hardened and irregular consistency, enlarged liver size, and the presence of adult *Fasciola sp.* worms in the bile duct lumen. These findings are consistent with the findings of Junita (2015), which suggested that livers infected with *Fasciola sp.* exhibit characteristics, such as uneven and paler coloration, enlarged liver size, harder consistency upon palpation in certain liver areas, and most notably, the dilation and thickening of the bile ducts, as well as the presence of *Fasciola sp.* worms in the bile ducts.

According to Jones *et al.* (2006), liver damage is caused by two factors: the migration of young worms and the continuous induction of adult worms. The migration of worms within the liver organ results in damage to the liver parenchyma, which is subsequently replaced by connective tissue or fibrosis, resulting in structural alterations to the liver. Consequently, the liver infected with *Fasciola sp.* has a firmer consistency than a normal liver, and enlarges in size. The hardening that occurs over time can lead to liver cirrhosis. In addition, the obstruction of bile ducts due to the presence of adult worms results in bile fluid, consisting of bile salts, bile pigments (bilirubin), and fats, being prevented from flowing and depositing within the bile ducts, leading to calcification within the bile ducts (Irawati *et al.*, 2013).



The presence of *Fasciola sp.* worms in the body of cattle can lead to tissue or organ damage, particularly in the liver. This tissue damage can result in bleeding and may cause anemia, which can disrupt the growth process of the cattle. This condition was also observed in a study conducted by Arifin et al., (2005), which suggested that the presence of *Fasciola sp.* worms in the body of animals, particularly in the liver and bile ducts, can lead to liver tissue damage and the occurrence of bleeding, ultimately resulting in anemia. This anemia is characterized by a decrease in the number of red blood cells (RBCs) below normal levels, as well as a decrease in hemoglobin (Hb) and hematocrit (PCV) levels. It is known that blood is responsible for transporting nutrients throughout the body. A decrease in blood volume in the body leads to a decline in the distribution of nutrients, which can result in slow development and growth.

The examination of *Fasciola sp.* worms in this study found that the morphology of the worms is as follows: an average length of 26 mm and width of 6.4 mm, narrow shoulders, blunt posterior part, oral sucker at the anterior part, leaf-like flattened dorsoventral body shape, and brownish-gray coloration. Therefore, it can be concluded that the *Fasciola sp.* worms identified in this study belong to the *Fasciola gigantica* species. This finding is consistent with the findings of Baker (2007), which suggested that the morphology of *Fasciola gigantica* includes a length ranging from 25 to 27 mm, width ranging from 3 to 12 mm, and one of its distinctive features is the presence of narrow shoulders, blunt posterior end, and longer ovaries with multiple branches.

Levine (1994) and Baker (2007), as well as Balqis et al., (2013), have stated that fasciolosis in Indonesia is caused by the *Fasciola gigantica* worm. This is further supported by Martindah et al., (2005), who asserted that the species of worm responsible for fasciolosis in ruminant livestock in Indonesia is exclusively *Fasciola gigantica*, with its intermediate host being the *Lymnaea rubiginosa* snail. The *gigantica* species is frequently identified in cattle originated from Indonesia, whereas the *hepatica* species is frequently detected in imported cattle (Wariata et al., 2019).

Previous research have shown that the type and sex of cattle may influence their resistance to *Fasciola sp.* worm infections. A study conducted by Rozi et al., (2015) found that the prevalence rates differ between male and female cattle, which is attributed to hormonal mechanisms. Moreover, Rozi et al., (2015 cited Nicolas 1989) suggested that genetic variations among species of animals can affect their resistance to parasitic infections. Breeding patterns and husbandry systems (extensive and intensive) can also influence cattle infection rates by worms. Purwanta et al., (2006) observed that the prevalence of fascioliasis in cattle is particularly high in extensively raised cattle, where the cattle graze for their own food. This practice may not ensure an adequate supply and nutritional value of their diet, leading to malnutrition in livestock and increased vulnerability to worm infections. Diseases caused by parasitic worms can

lead to financial and temporal losses for farmers, the extent to which depends on the quantity of worms present in the cattle. The prevention of *Fasciola sp.* worm manifestations can be achieved by controlling the intermediary host, which is the water snail. To effectively control snails, it is important to manage drinking water properly to prevent animals from consuming contaminated water sources that are infested with snails. Additionally, the practice of grazing livestock in higher-altitude regions or the implementation of rotational grazing systems can help control snail populations (Rozi et al., 2015).

## CONCLUSION

The results of this study suggested that eight out of 30 samples of slaughtered cattle at the Tanjung Sub-district Slaughterhouse, North Lombok Regency were found to be infected with *Fasciola sp.* worms. The presence of *Fasciola sp.* worms was identified in the liver and bile ducts of the cattle.

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## CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest with any of the parties involved in this study.

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## ETHICAL APPROVAL

This study did not require ethical approval.

## AUTHORS' CONTRIBUTIONS

All authors were involved in conceptualization, data collection, writing the original draft, & editing.

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