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A Review of Fasciolosis in Ruminants: Supporting Control, Prevention, and Improving Livestock Productivity

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Abstract
Ruminants are important animals that contribute significantly to animal husbandry by supporting food production and ensuring the sustainability of agribusiness. This group consists of large ruminants and small ruminants that have high economic value as sources of meat, milk, and labor. Ruminant productivity is often constrained by parasitic diseases such as Fasciolosis that caused by *Fasciola hepatica* and *Fasciola gigantica*. Fasciolosis has a wide global distribution with significant impacts on animal health, productivity, and economic losses. The purpose of this article review is to give or provide an overview of Fasciolosis in ruminants including life cycle, supporting and prevention to help improving also increasing livestock productivity. Fasciolosis infection damages the liver, causing acute to chronic damage, characterized by anemia, weight loss, decreased milk production, and even death. Early detection remains a challenge due to the limitations of conventional methods, such as worm egg examinations and postmortem methods require technical support that is rarely available in rural areas. Farmers' lack of knowledge worsens the impact of the losses incurred. Therefore, prevention attempt based on the implementation of control strategies are key to minimizing economic losses and maintaining the sustainability of livestock businesses.

INTRODUCTION

Ruminants are a major pillar of agriculture because they were the first species to be domesticated for livestock farming. Ruminants evolved more than 50 to 60 million years ago (Weaver, 2020). Ruminants are a group of mammals characterized by rumination or rechewing food that has been swallowed (Pérez-Barbería, 2020). Ruminants are also known as four-chambered mammals, which allows them to convert cellulose and other plant materials into high-quality proteins, vitamins, and minerals, helping to improve food security (Beesley *et al.*, 2018). The digestive tract of ruminants is called four-chambered because it has four interconnected chambers, namely the rumen, reticulum, omasum, and abomasum (Samarang *et al.*, 2020). Ruminant livestock are divided into two groups, namely large ruminants and small ruminants. Large ruminants consist of cattle and buffalo. Meanwhile, small ruminants consist of goats and sheep. Cattle are members of the *Bovidae* family and the *Bovinae* subfamily. The

Bovidae family consists of cloven-hoofed animals and also includes ruminants. Cattle are not only used for their meat and milk, but also for their labor to help humans with their work (Mehmood *et al.*, 2017). Goats and sheep are small ruminants that have great potential for development because they are dual-purpose (Ginting & Patriani, 2018). Dual-purpose means that livestock can be used for their meat and milk. Goats are livestock that are easily adaptable to their environment and are relatively easy to raise.

Fasciolosis is a parasitic disease that attacks livestock caused by flatworms of the genus *Fasciola*, also known as liver flukes (Wariata *et al.*, 2019). The two species most often identified as causative agents of fasciolosis are *F. hepatica* and *F. gigantica* (Lalor *et al.*, 2021). These parasites are characterized by a complex life cycle involving one or more intermediate hosts (Suratma & Mahatmi, 2023). Fasciolosis has the widest longitudinal, latitudinal, and altitudinal distribution among worm diseases, it is found on every continent except Antarctica (Mas-Coma *et al.*, 2019). *Fasciola hepatica* has a global distribution but is dominant in temperate zones. Meanwhile, *Fasciola gigantica* is mostly found in tropical continents, particularly Asia and Africa (Sumruayphol *et al.*, 2020). However, where climatic conditions favor both parasites, they can coexist and hybridize. Fasciolosis is a disease that has an economic impact on domestic livestock such as cattle, sheep, goat, and buffalo. The effects of *Fasciola sp*. on the host's immune system can interfere with the host's ability to resist other microbial infections such as salmonella (Beesley *et al.*, 2018), which further compromises animal health, welfare, and productivity. These parasitic worms migrate in the liver, develop and settle in the bile ducts, causing the liver to appear macroscopically enlarged with a fragile consistency (Stuen & Ersdal, 2022). Microscopically, hepatic necrosis, fibrosis, hemorrhage, and cholangitis up to hepatic cirrhosis can be observed (Cable *et al.,* 2017).

Fasciolosis can interfere with livestock growth, causing losses to farmers due to the imbalance between livestock maintenance and health care costs and livestock selling prices (Firdaus *et al.,* 2017). In addition, humans can also contract liver fluke disease because many farmers and communities often consume undercooked meat. Fasciolosis is very difficult for farmers to detect, but it is very damaging to farmers due to its high prevalence, with symptoms including weight loss, reduced milk production in dairy cows, and reduced livestock fertility (Purwaningsih *et al.*, 2017). Fasciolosis can infect acutely, sub-acutely, and chronically (Irawati *et al.*, 2021). Acute infection is caused by the migration of young worms in liver tissue, which causes liver tissue damage, with symptoms of livestock becoming weak, rapid but short breathing, and an enlarged abdomen accompanied by pain. The sub-acute form shows no symptoms at all, but can cause sudden death. The chronic form occurs when the worm parasites reach adulthood at 4-5 months, with symptoms of anemia causing livestock to become weak, lethargic, experience a decrease in appetite, tire easily, have pale mucous membranes, diarrhea, edema between the chin and lower abdomen, and death can occur within 1-3 months (BET Cipelang, 2018).

One of the obstacles in increasing livestock productivity is the presence of various diseases that greatly affect livestock life. The outbreak of diseases such as Fasciolosis in livestock will cause farmers to suffer significant economic losses due to a lack of information and knowledge about diseases that suddenly attack their livestock, causing them to die suddenly (Martindah *et al.*, 2018). This is especially right for farmers in remote rural areas. The lack of veterinarians and the high costs incurred by farmers to pay for veterinary services slow down the treatment of livestock. Therefore, efforts are needed to reduce losses and morbidity rates in livestock due to Fasciolosis infection through a control program based on early diagnosis. Early diagnosis is intended to detect the presence of worms in the body before they cause more severe pathological changes. The worm egg detection method is a conventional method and can only be performed when the infection is chronic and adult worms are present in the bile. In addition, diagnosis can be made by postmortem examination of carcasses at slaughterhouses and meat markets by directly examining the liver. However, in reality the symptoms of Fasciolosis infection are still very difficult for farmers to detect. The main cause is the knowledge gap among farmers.

Prevention of Fasciolosis is very important for livestock. One way to do this is by increasing farmers' knowledge through participatory extension, which involves all relevant stakeholders such as veterinarians, extension workers, farmers, and researchers. The extension discusses the clinical symptoms of infection so that the sooner the symptoms are detected, the sooner treatment can be carried out, thereby minimizing losses to farmers (Rosyidi *et al.*, 2020). From an agribusiness perspective, Fasciolasis causes significant direct and indirect economic losses. In the case of small farmers with limited capital, Fasciolosis can reduce income and disrupt the sustainability of the livestock business. Overall, it can be concluded that Fasciolosis is a real threat to the productivity and profitability of livestock businesses. Therefore, this review focuses on the Fasciolosis focusing in Ruminants and associated with the way to control and prevent Fasciolosis.

RESEARCH METHODOLOGY

Literature Search

The literature search for this review was systematically designed and executed by one of the authors to ensure methodological rigor and comprehensive data acquisition. Electronic searches were performed across several reputable academic databases, namely Google Scholar, PubMed, ResearchGate, and Scopus, which collectively encompass a wide range of peer-reviewed literature in biomedical and veterinary sciences. The search process was conducted between September 22, 2025, and October 3, 2025, covering both historical and contemporary publications relevant to the study topic.

A combination of controlled vocabulary terms and free-text keywords was employed to maximize retrieval sensitivity. The primary search terms included “Fasciolosis,” “*Fasciola hepatica*,” and “*Fasciola gigantica*.” The search syntax was adjusted according to the database-specific language to optimize compatibility and ensure retrieval of all potentially relevant records. Additionally, the reference lists of qualified primary research papers, narrative reviews, and systematic reviews were manually screened to identify further eligible studies not captured by the electronic search. This backward citation tracking was implemented to minimize publication bias and to ensure the inclusion of all pertinent evidence.

Criteria for Screening and Eligibility

The study selection followed a structured two-stage workflow: an initial screening of titles and abstracts, followed by a comprehensive full-text review. Inclusion was based on predefined criteria, requiring articles to be published in English or Indonesian. Furthermore, selected studies had to provide evidence whether clinical or experimental regarding the potential association between *Fasciola hepatica* and *Fasciola gigantica*. Publications that satisfied the initial abstract screening were retrieved in full text for comprehensive evaluation to determine their suitability for inclusion in the final synthesis.

Inclusion and Exclusion Criteria

For clinical research, inclusion was restricted to studies providing verifiable evidence of fasciolosis, such as pathological confirmation, histopathological assessment, or diagnostic imaging demonstrating the presence of the parasite. For basic research, eligible studies included those reporting any form of experimental, serological, or molecular evidence of

Fasciola infection. Articles lacking adequate methodological details or relevant diagnostic evidence were excluded. Only studies fulfilling all inclusion parameters were incorporated into the final analysis and discussion to ensure data reliability and scientific validity.

Analysis

The analytical framework encompassed studies reporting identification of fasciolosis, irrespective of whether the relationship with Fasciola species was direct or indirect. Case reports were included only if they met at least one of the following criteria: a) established a direct etiological relationship with fascioliasis, b) described conditions occurring as sequelae of prior fascioliasis, or c) confirmed the presence of *Fasciola spp.* within host tissues. All eligible references—national or international, regardless of design or quality—were documented systematically and critically analyzed to identify trends, correlations, and gaps in the existing literature.

Data Extraction

Data from each included publication were meticulously extracted using a standardized template. Key variables recorded comprised article title, principal author, year of publication, study design, research methodology, primary outcomes, and relevant observations. Extracted data were organized into a comprehensive database to facilitate structured comparison, synthesis, and critical interpretation during the subsequent stages of analysis.

RESULT AND DISCUSSION

Fasciolosis

Fasciolosis is a foodborn disease caused by at least two species of the genus *Fasciola*, namely *Fasciola hepatica* and *Fasciola gigantica*. Fasciolosis also commonly called liver fluke disease that can infect animals and humans (Tenorio & Molina, 2021). This disease is often recognized as a significant parasitic condition in livestock, commonly acquired through the consumption of metacercariae that encyst on foliage, eaten by animals or as raw vegetables by humans. It is regarded as one of the major zoonotic helminthic infections affecting ruminants in regions where it is endemic, as it is linked to various socioeconomic challenges. The severity of Fasciolosis cases depends on the number of metacercariae ingested and their infectivity. If a large number of metacercariae are ingested, it will result in the death of livestock before the worms reach maturity. Additionally, it also depends on the stage of infestation, namely the migration of young worms and the development of adult worms in the bile duct.

Predisposing factors for fasciolosis include: 1) Age, according to Hambal *et al.* (Wibisono, JF., 2019), the older the cow, the higher the prevalence and intensity. 2) Management system, according to (Ani & Masri, 2025) cattle raised extensively are more likely to be infected with Fasciola compared to those raised intensively. 3) Season, according to (Ngazizah *et al.*, 2023) wet areas with high rainfall are suitable for the development and spread of liver flukes. 4) Species, the level of infection with Fasciola sp. will differ among different livestock species. (Wibisono, JF., 2019) found that buffalo are more susceptible to *Fasciola gigantica* infection than cattle.

The Morphology of Fasciola sp.

When fully grown, the bodies of both Fasciola species resemble leaves and have a large point at the back. The two suckers are tiny and closely spaced in a cone-shaped region on the front. The pharynx is readily visible. The two testes, each of which has a branch, split the body in half between the second and third quarters. As a result, *F. gigantica* is longer and slimmer, with parallel lateral walls and absent or diminished cone shoulders. Their body lengths differed statistically significantly, with *F. gigantica* having the longest and *F. hepatica* having the shortest. *F. gigantica* has a more transparent and noticeably leaf-like body and is larger than *F. hepatica*, reaching up to 7.5 cm in length and 1.5 cm in breadth. Its shoulders are less prominent, and its conically formed anterior end is shorter (Purwono, 2019). The use of body proportions as a diagnostic tool is supported by multiple studies. Research by Imani Baran et al. (2017) highlights these phenotypic differences as the primary means of identification. This is further corroborated by Suratma & Mahatmi (2023**)**, whose South African study confirmed that body length, width, and their resulting ratio are reliable indicators of species shape, noting a statistically significant difference in the average length-to-width ratio between the two. The difference between the two species of Fasciola worms lies in the shape of the body and the size of the eggs. The eggs of liver flukes are oval, have smooth, thin walls, are yellow in color, highly permeable, and equipped with an operculum at one pole. This operculum functions as a door that opens when the egg hatches, releasing the ciliated mirasidium larva.

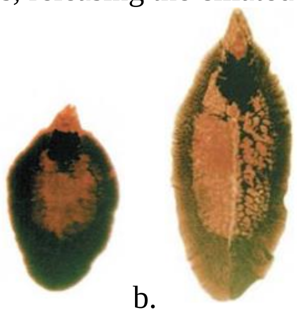

Figure 1. (a) *Fasciola hepatica* (b) *Fasciola gigantica* (Taylor *et al.*, 2016)

The Prevalence of Fasciola sp. in Ruminants

Fasciola hepatica are widely distributed and infects a broad range of animal hosts, such as human, sheep, goats, and cattle. Although it can be found all over the world, temperate and subtropical regions are where it is most prevalent (Lalor *et al.*, 2021). Meanwhile, tropical and subtropical areas of Africa, Asia, and portions of the Americas are home to *Fasciola gigantica.* Numerous herbivores, such as sheep, cattle, and buffaloes, are impacted. There is a possibility of hybridisation between *F. hepatica* and *F. gigantica* in places where both species coexist, leading to genetic heterogeneity and potential issues in proper species identification (Zulqarnain *et al.*, 2024). In tropical regions, including Indonesia, fasciolosis is usually caused by the species *Fasciola gigantica*, which attacks livestock such as cattle, buffalo, goats, and sheep, and sometimes pigs.

Table 1. The prevalence of Fasciola sp. were identified in ruminants

Location	Species Fasciola sp.	Host	References
Malaysia	*F. gigantica*	Cattle	Najib *et al.*, 2019
Pakistan	*F. gigantica*, *F. hepatica*	Cattle, Sheep, Goat, Buffalo	Rizwan *et al.*, 2022
Peru	*F. hepatica*	Cattle	Diaz-Quevedo *et al.*, 2021
Iran	*F. gigantica*	Cattle, Sheep, Goat, Buffalo	Soosaraei *et al.*, 2020
Nigeria	*F. gigantica*	Cattle, Sheep, Goat	Isah, 2019
Bangladesh	*F. gigantica*	Goat	Mia *et al.*, 2021
Egypt	*F. gigantica*, *F. hepatica*	Cattle	El- Tahawy *et al.*, 2017
Vietnam	*F. gigantica*	Cattle	Nguyen *et al.*, 2017
Zambia	*F. gigantica*	Cattle	Nyirenda *et al.*, 2019
Saudi Arabia	*F. gigantica*, *F. hepatica*	Sheep	Ashoor *et al.*, 2023

From the table above, it can concluded that the previous researches were true that *F. gigantica* is common in Asia and Africa, while *F. hepatica* is spread across all the continents. Fascioliasis has been reported as most prevalent in the densely populated province of Bongara, Peru with 93,9% in cattle based on positive detection in liver samples. The number of infections also big in Terengganu Province of Malaysia with 89% in goat. Infections in sheep has a big number in Punjab, Pakistan with 65,7%. According to the provisional distribution data, the province of Punjab had a higher number of infected sheep because the environmental conditions are dominated with tropical, irrigated lowland rice fields, floods and rain that may lead to the outbreak of Fasciolosis. One of the studies conducted in Punjab found that the prevalence of fascioliasis was higher in winter than in summer because the rate of infection increases with the rate of humidity in environment and similar observations were reported in another study.

In Indonesia, almost all cases of fasciolosis are caused by *F. gigantica* because Indonesia is a tropical country with high humidity. Many cases have been found in various regions, including in Manokwari Regency with 34.96% in Bali cattle (Purwaningsih *et al.*, 2017); Kabawo District, Muna Regency, Southeast Sulawesi, with 23.3% in cattle (Zulkarnain *et al.*, 2021); Kupang, East Nusa Tenggara, with 17.19% in beef cattle (Winarso *et al.*, 2021); Jati Agung District, South Lampung Regency, with 6.25% in mud buffalo (Estuningsih *et al.*, 2003) and Sukabumi, West Java, with 15% in beef cattle (Endrakasih, 2018).

The substantial difference in the prevalence of fascioliasis between Bongará Province, Peru (93.9%), and Jati Agung District, Lampung, Indonesia (6.25%) is because the differences in livestock management systems implemented in the two regions. In several areas of Peru, cattle are commonly raised under extensive grazing systems, in which animals are allowed to graze freely on natural pastures. These grazing areas are often located near wetlands, irrigation channels, or flooded agricultural fields that provide suitable habitats for the intermediate host snails of *Fasciola* spp. Consequently, livestock have a higher probability of ingesting vegetation contaminated with infective metacercariae. In contrast, livestock management practices in certain parts of Indonesia, including Lampung, may involve semi-intensive or controlled feeding systems, such as the cut-and-carry method, which can reduce the exposure of animals to contaminated grazing environments.

Furthermore, the presence and population density of intermediate host snails, particularly those belonging to the genus *Lymnaea*, play a crucial role in the transmission dynamics of fascioliasis. The distribution and abundance of these snails are strongly influenced by environmental factors, including temperature, humidity, water availability, soil moisture, and vegetation cover. In Peru, environmental conditions such as irrigated agricultural land, permanent water sources, and high levels of humidity may support a larger population of intermediate host snails, thereby facilitating the life cycle of *Fasciola spp.* and increasing the risk of infection in livestock. Conversely, ecological variations in Lampung may limit the proliferation of these intermediate hosts, resulting in a relatively lower prevalence of infection.

The Life Cycle of *Fasciola sp.*

Lymnaeid snails are the most widely transmitted snail of *Fasciola* species (Caravedo & Cabada, 2020). *Fasciola sp.* completes its life cycle or stages of development until it reaches the bile duct. The life cycle of liver flukes begins when eggs are released from the uterus of the fluke and enter the bile duct or hepatic duct of the host. The eggs are subsequently passed into the animal's intestines and eliminated from the body through fecal excretion. A liver fluke *(F. hepatica)* can produce about 1331 eggs per day in sheep and 2628 eggs per day in cattle. The number of worms in the bile duct cannot be determined solely from the number of eggs found in the feces. Inside the host's body, such as livestock, adult worms live in the liver and lay eggs in the intestines, which are then excreted along with feces. The eggs hatch into larvae with cilia all over their bodies, called mirasidia. Mirasidia swim in search of *Lymnea* snails, and if unsuccessful, they die (Preza *et al.*, 2019). After entering the snail's body, the miracidium transforms into a sporocyst after about two weeks. The sporocyst then undergoes asexual reproduction inside the snail's body, producing many larvae. The sporocyst then transforms into several redia, which also undergo asexual reproduction to become sercariae. The cercariae larvae then become headed metacercariae, which then exit the snail and swim to find plants at the water's edge, such as grass, rice plants, or other aquatic plants. After attaching themselves, the metacercariae encyst and become cysts that can survive for a long time on the plant. If the plant is eaten by ruminant animals, the cyst can penetrate the intestinal wall, enter the liver, then the bile duct, and after several months mature and begin laying eggs. This process repeats each time the cycle begins again.

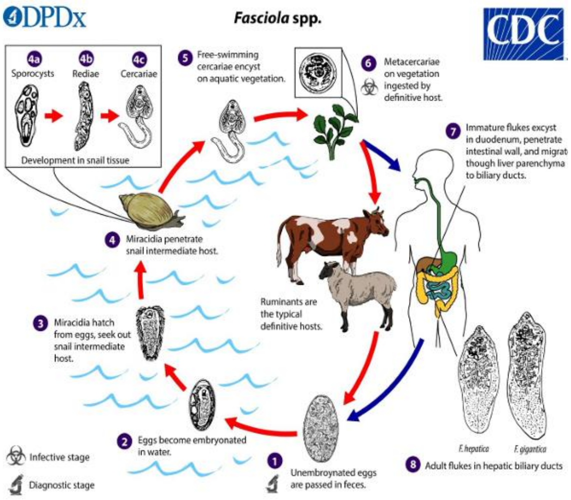

Figure 2. The life cycle of *Fasciola sp*. (Centers for Disease Control (CDC), 2019)

Clinical Sign

Fasciolosis in livestock often does not show clear clinical symptoms. Possible signs include weight loss, weakness, loss of appetite, pale skin, and sometimes swelling around the lower jaw that can spread to the neck and lower chest, diarrhea, and dull-looking fur. These symptoms are similar to other parasitic diseases or malnutrition, so farmers may not be aware of the risk of fasciolosis in livestock and humans. Therefore, efforts to prevent and control it are often neglected. In general, *Fasciola sp.* infections can be classified into three forms: acute, subacute, and chronic. Acute infections are caused by the migration of young worms into the liver tissue, resulting in damage to the organ. Infected livestock may show symptoms such as weakness, rapid and shallow breathing, and abdominal distension accompanied by pain. Fasciolosis in the subacute form sometimes shows no symptoms or only minimal symptoms. However, when the livestock is used for work in the fields, transportation, or experiences exhaustion, sudden death can occur. The chronic form of fasciolosis occurs when the worms reach the adult stage about 4-5 months after infection. Symptoms include anemia causing lethargy, weakness, decreased appetite, easy fatigue, pale skin and mucous membranes, diarrhea, swelling in the area around the chin and lower abdomen, and jaundice. Death can occur within 1-3 months after symptoms appear. According to (Ridwan *et al.*, 2021), parasitic worm infections in livestock can cause a decrease in the number of erythrocytes, which affects the absorption of nutrients from feed.

Diagnosis

Numerous diagnostic techniques are available to identify a fasciolosis infection. Nonetheless, there are three main techniques for diagnosis: imaging, indirect immunology, and direct parasitology. Parasitological fecal examination, which looks for the parasite in the feces, is the accepted technique for direct parasitic infection (Rinca *et al.*, 2019). Conversely, indirect immunological techniques use serological principles to identify any antigen in serum, feces, or intradermal fluid. Both approaches have shown promise as instruments for monitoring and detection. However, several of them require somewhat complex invasive procedures to obtain the sample (Preza *et al.*, 2019)

Observation of clinical symptoms or parasitology has its limitations because it requires instinct, experience, and in-depth understanding to identify whether livestock are infected with liver flukes, so as not to misinterpret the results of microscopic examination. Laboratory diagnosis of fasciola is performed by examining fecal samples using several methods. One common method is the native examination, where feces are dripped with distilled water to create a suspension that is then examined under a microscope. Another method is sedimentation, where the clearest part of the fecal sample is discarded, while the cloudy portion is collected for examination under a microscope. The flotation method, on the other hand, involves suspending the stool with distilled water in a specific ratio, then filtering it repeatedly to obtain a clear liquid that is examined under a microscope after being dripped with a concentrated $ZnSO_4$ solution and covered with a glass cover .

One of the significant challenges in diagnosing is its often-asymptomatic presentation, which can lead to underdiagnosis and delayed treatment. An alternative approach to overcome difficulties in diagnosing fasciolosis is through serodiagnosis, which is the examination of antibodies against antigens specific to *Fasciola spp.* in blood serum in addition to finding adult worms in the liver of livestock. Serodiagnosis is performed using the Enzyme Linked Immunosorbent Assay (ELISA), which has been developed and used to diagnose *F. hepatica* infections in cattle and sheep. Antigens from the excretory/secretory (ES) stage of adult flukes are commonly used in ELISA tests, and antibodies against these ES antigens can be detected early in infection, specifically in weeks 2–4. These results indicate that the ELISA test can be applied for diagnosis and control of fasciolosis in natural field infections.

Control and Prevention

Effective fasciolosis control in a region must be carefully planned by combining the following elements: 1) Strategic administration of anthelmintics to expel worms from the host's body at the most effective time to prevent worm egg contamination in the environment, 2) Minimizing the chances of infection by managing livestock maintenance and grazing, 3) Controlling fasciolosis involves controlling snails as intermediate hosts by draining grazing fields, spraying molluscicides, and introducing snail predators to rice fields .

To increase the animals' productivity and general health, effective control and management measures, such as the appropriate use of anticoccidials, should be implemented (Akyüz *et al.*, 2019). Steps to prevent this disease include conducting regular laboratory tests to observe the development of worm eggs every 2-3 months, improving husbandry practices, and placing livestock far away from puddles or ponds. In addition, feed them grass harvested during the day and dried naturally. Prevention of this disease can be achieved by administering deworming medication routinely every six months at the recommended dosage. Preventive measures for fascioliasis can be taken by avoiding the feeding of forage contaminated with *F. gigantica* metacercariae released by snails as intermediate hosts. The life cycle of *F. gigantica* is highly dependent on intermediate hosts. In the intermediate host, *F. gigantica* eggs are released with ruminant feces and develop into sporocysts, rediae, and cercariae. Cercariae that exit the snail's body contaminate and attach to grass, becoming infective metacercariae. If the contaminated grass is consumed by ruminant livestock, the metacercariae are ingested by the livestock. Infection can be prevented by grazing livestock away from lakes, swamps, rivers, and other water bodies. This parasite affects ruminants of all ages, and as a preventive measure, livestock should be avoided from being fed roughage or forage contaminated with snails.

The Relation with Agribusiness

The incidence of Fasciolosis depending on the husbandry system. The natural tendency of cattle to graze freely in pastures or open fields is restricted. This restriction can accelerate infection. The spike in Fasciolosis in intensive husbandry systems is due to livestock not being grazed in open areas. Feeding is done exclusively in pens, minimizing contact with the natural environment. This closed and crowded pen environment can be a factor in accelerating the spread of parasites among livestock populations (Ridwan *et al*., 2021). From an economic perspective, the losses caused by fascioliasis are enormous (Damayanti *et al*., 2019). Fasciolosis was estimated to cause significant economic losses in Indonesia, reaching 500 billion rupiah per year. These losses were mainly caused by liver damage and stunted growth in infected cattle. Economic losses are also assessed based on the potential infected livestock population, the extent of damage caused by the parasite to meat and milk production, and the unfitness of animal products for consumption due to parasite infection (Winarso *et al.*, 2021). Additionally, weight loss, reduced milk production in dairy cows, declining meat quality, and fertility issues further exacerbate the economic losses suffered by farmers.

CONCLUSIONS AND SUGGESTION

Fasciolosis caused by *Fasciola hepatica* and *Fasciola gigantica*, remains a significant parasitic disease affecting livestock and human health, particularly in tropical regions like Indonesia. Its impact on animal productivity and economic losses in agribusiness is substantial. Effective control requires integrated approaches, including regular deworming, improved grazing management, and snail control. Strengthening farmer awareness, conducting routine diagnostic surveillance, and promoting sustainable husbandry practices are essential to reduce infection rates and improve livestock productivity.

REFERENCES

Akyüz, M., Kirman, R., Yaya, S., Gülbeyen, H., & Güven, E. (2019). Endoparasites Determined by Fecal Examination in Sheep in Erzurum Province. *Turkiye Parazitoloji Dergisi*, *43*(4), 187–193. https://doi.org/10.4274/tpd.galenos.2019.6512

Ani, A. P., & Masri, M. (2025). *Dampak Parasit terhadap Kesehatan dan Produktivitas Sapi di Peternakan Rakyat Indonesia : Faktor Risiko dan Strategi Pencegahan*. *1*(1).

Beesley, N. J., Caminade, C., Charlier, J., Flynn, R. J., Hodgkinson, J. E., Martinez-Moreno, A., Martinez-Valladares, M., Perez, J., Rinaldi, L., & Williams, D. J. L. (2018). Fasciola and fasciolosis in ruminants in Europe: Identifying research needs. *Transboundary and Emerging Diseases*, *65*(April 2017), 199–216. https://doi.org/10.1111/tbed.12682

Cable, J., Barber, I., Boag, B., Ellison, A. R., Morgan, E. R., Murray, K., Pascoe, E. L., Sait, S. M., Wilson, A. J., & Booth, M. (2017). Global change, parasite transmission and disease control: Lessons from ecology. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *372*(1719). https://doi.org/10.1098/rstb.2016.0088

Caravedo, M. A., & Cabada, M. (2020). <p>Human Fascioliasis: Current Epidemiological Status and Strategies for Diagnosis, Treatment, and Control</p>. *Research and Reports in Tropical Medicine*, *Volume 11*, 149–158. https://doi.org/10.2147/rrtm.s237461

Damayanti, L. P. E., Almet, J., & Detha, A. I. R. (2019). Deteksi dan prevalensi fasciolosis pada sapi bali di Rumah Potong Hewan (RPH) Oeba Kota Kupang. *Jurnal Veteriner Nusantara*, *2*(1), 13–18. http://ejurnal.undana.ac.id/JVN

Endrakasih, E. (2018). Efektifitas albendazole terhadap fasciola sp pada peternakan sapi potong rakyat di kecamatan gegerbitung kabupaten sukabumi. *Jurnal Agroekteknologi Dan Agribisnis*, *2*(1), 1–8.

Estuningsih, S. E., Widjajanti, S., & Adiwinata, G. (2003). Perbandingan antara uji elisa-antibodi dan pemeriksaan telur cacing untuk mendeteksi infeksi fasciola gigantica pada sapi. *Jitv*, *9*(1), 55–60.

Firdaus, M., Sujarwanta, A., & Lepiyanto, A. (2017). STUDI RENTAN INFEKSI CACING PARASIT (Fasciola hepatica) PADA HATI SAPI. *Seminar Nasional*, *1*.

Ginting, N., & Patriani, P. (2018). *Pengelolaan Ternak Kambing dan Domba* (Issue Fakultas Peternakan Universitas Sumatera Utarar).

Imani Baran, A., Cheraghi Saray, H., & Katiraee, F. (2017). Molecular determination of Fasciola spp. Isolates from domestic ruminants fecal samples in the northwest of Iran. *Iranian Journal of Parasitology*, *12*(2), 243–250.

Irawati, C. D., Pancasunu, H. S., & Kamal, M. (2021). *Gejala Klinis, Makropatologi dan Histopatologi Fasciolosis Kronis pada Domba*. *3*, 167–186.

Lalor, R., Cwiklinski, K., Calvani, N. E. D., Dorey, A., Hamon, S., Corrales, J. L., Dalton, J. P., & De Marco Verissimo, C. (2021). Pathogenicity and virulence of the liver flukes Fasciola hepatica and Fasciola Gigantica that cause the zoonosis Fasciolosis. *Virulence*, *12*(1), 2839–2867. https://doi.org/10.1080/21505594.2021.1996520

Martindah, E., Widjajanti, S., Estuningsih, S. E., & Suhardono. (2018). Meningkatkan Kesadaran Dan Kepedulian Masyarakat Terhadap Fasciolisis Sebagai Penyakit Zoonosis. *Balai Penelitian Veteriner*, *15*(3), 143–154.

Mas-Coma S, Valero MA, B. M. (2019). Fasciolosis. *Adv Exp Med Biol*, *1154*, 71–103.

Mehmood, K., Hui, Z., Sabir, A. J., Abbas, R. Z., Durrani, A. Z., Saleem, M. H., Rehman, M. U., Iqbal, M. K., Wang, Y., Ahmad, H. I., Abbas, T., Ghori, M. T., Ali, S., Khan, A. U., & Li, J. (2017). A Review on Epidemiology, Global Prevalence and Economical Losses of Fasciolosis in Ruminants. *Microbial Pathogenesis*. https://doi.org/10.1016/j.micpath.2017.06.006.This

Ngazizah, F. N., Wulandari, M., & Hasanah, R. (2023). Skrining Fasciolosis Pada Hewan Qurban Di Palangka Raya. *Jurnal Veteriner Nusantara*, *6*(2), 422–427. https://doi.org/10.35508/jvn.v6i2.12114

Ningtias, P. I. (n.d.). *Prevalensi Fasciolosis dan Rencana Pengendalian di BET Cipelang*.

Pérez-Barbería, F. J. (2020). The Ruminant: Life History and Digestive Physiology of a Symbiotic Animal. *Sustainable and Environmentally Friendly Dairy Farms*, 19–45.

Preza, O., Klapa, I., Tsiakalos, A., Cokkinos, D. D., & Chatziioannou, A. (2019). Fascioliasis: A challenging differential diagnosis for radiologists. *Journal of Radiology Case Reports*, *13*(1), 11–16. https://doi.org/10.3941/jrcr.v13i1.3451

Purwaningsih, Noviyanti, & Putra, R. P. (2017). Penelitian Distribusi dan Faktor Risiko Fasciolosis pada Sapi Bali di Distrik Prafi, Kabupaten Manokwari, Provinsi Papua Barat. *Acta VETERINARIA Indonesiana*, *5*(2), 120–126.

Purwono, E. (2019). Gambaran Kasus Fasciolosis (Cacing Hati) Pada Sapi Bali Berdasarkan Data Hasil Pemeriksaan Hewan Qurban Di Kabupaten Manokwari. Politeknik Pembagunan Pertanian (Polbangtan) Manokwari. 2018. *Jurnal Triton*, *10*(1), 69–74. https://jurnal.polbangtanmanokwari.ac.id/index.php/jt/article/view/13

Ridwan, M., Suwanti, L. T., Suprayogi, T. W., Mufasirin, M., Kusnoto, K., & Hastutiek, P. (2021). Prevalensi Fascioliasis pada Kerbau di Kabupaten Agam, Sumatra Barat, Indonesia. *Media Kedokteran Hewan*, *32*(3), 105. https://doi.org/10.20473/mkh.v32i3.2021.105-113

Rinca, K. F., Prastowo, J., Widodo, D. P., & Nugraheni, Y. R. (2019). Trematodiasis occurrence in cattle along the Progo River, Yogyakarta, Indonesia. *Veterinary World*, *12*(4), 593–597. https://doi.org/10.14202/vetworld.2019.593-597

Rosyidi, A., Ngongu Depamede, S., Wariata, W., Sriasih, M., & Ali, M. (2020). Upaya Pencegahan Dan Pengobatan Penyakit Zoonosis Cacing Hati (Fasciola sp) Pada Sapi Bali Di Kelompok Iye Gati Desa Sukadana Kecamatan Pujut Kabupaten Lombok Tengah. *Prosiding PEPADU 2020*, *2*, 283–288.

Samarang, Syahnuddin, M., Widjaja, J., Sumolang, P. P. F., & Lobo, L. T. (2020). Fasciolosis Pada Sapi Sebagai Risiko Zoonosis Di Desa Maranatha , Kabupaten Sigi Sulawesi Tengah. *Prosiding Seminar Nasional Biologi FMIPA UNM*, 63–70.

Stuen, S., & Ersdal, C. (2022). Fasciolosis—An Increasing Challenge in the Sheep Industry. *Animals*, *12*(12). https://doi.org/10.3390/ani12121491

Sumruayphol, S., Siribat, P., Dujardin, J. P., Dujardin, S., Komalamisra, C., & Thaenkham, U. (2020). Fasciola gigantica, F. Hepatica and Fasciola intermediate forms: Geometric morphometrics and an artificial neural network to help morphological identification. *PeerJ*, *2020*(2). https://doi.org/10.7717/peerj.8597

Suratma, N. A., & Mahatmi, H. (2023). Morfometri dan Karakteristik Genetik Cacing Hati (Fasciola Spp.). *Seminar Nasional Fakultas Kedokteran Hewan*, 66–77.

Tenorio, J. C. B., & Molina, E. C. (2021). *Vet Integr Sci Vet Integr Sci Dynamics and Epidemiology Vet Integr Sci*. *19*(July), 467–485.

Wariata, W., Sriasih, M., Rosyidi, A., & Ali, M. (2019). *Infeksi dan Tingkat Penyebaran Parasit Zoonosis Cacing Hati (Fasciola sp .) Pada Sapi Di Kabupaten Lombok Tengah dan Lombok Timur (Infection and Distribution of Liver Fluke (Fasciola Sp) Zoonotic Parasite on Cattle in Central Lombok and East Lombok Di*. *5*(2), 86–92.

Weaver, S. (2020). The Ruminant Digestive System. *The Goat*, *Figure 2*, 36–39. https://doi.org/10.1515/9780691208527-009

Wibisono, JF., R. S. (2019). Insiden Hewan Qurban Sebagai Vektor Penular Penyakit Cacing Hati (Fasciolosis) di Surabaya. *Kajian Veteriner D*, *41*(2), 84–93. http://ejurnal.undana.ac.id/JKV/article/view/1038

Winarso, A., Kale, N. D., Rihi, D. M., Hurek, D. T. M., Pello, P. S., Beti, V. N., Moi, M. M., Boru, M. J. N., Manafe, R. Y., Parera, M. D. E., Jo, M. G. M., Nadja, Y. R., Dhiu, D. T., Cantona, M., Amleni, L. D., Koanak, S. J., Nawa, Y. V., Daki, A. N., & Pora, J. F. T. L. (2021). Prevalensi trematodiasis pada sapi bali di Kupang dengan pemeriksaan feses metode filtrasi. *ARSHI Veterinary Letters*, *5*(1), 13–14. https://doi.org/10.29244/avl.5.1.13-14

Zulkarnain, D., Aku, A. S., Rahmatullah, R., & Munadi, L. M. (2021). Prevalensi Cacing Fasciola Hepatica Pada Sapi Akseptor Program Upsus Siwab Di Kabupaten Muna. *Journal of Livestock and Animal Health*, *4*(1), 1–6. https://doi.org/10.32530/jlah.v4i1.291

Zulqarnain, M., Abbas, S., Zaman, M. A., Bosire, E. M., Ali, G., Kanwal, N., Sarfaraz, M. Z., Khalil, I., & Bibi, S. (2024). Plant as Anthelmintic Allies in the Fight against Fasciolosis: A Review. *International Journal of Veterinary Science, Homeopathy/Herbal Medicine*, 503–509. https://doi.org/10.47278/book.cam/2024.472