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Case report of liver fluke in cattle from the municipality of Madera, Chihuahua

Reporte de caso de fasciolosis hepática en bovinos del municipio de Madera, Chihuahua

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ABSTRACT

The presence of *Fasciola hepatica* in cattle from a production unit located in the municipality of Madera, Chihuahua, Mexico, is reported. This area is characterized by a temperate, subhumid climate with the presence of ephemeral water bodies. The case involved seven affected animals, four of which presented prostration and submandibular edema, and three died. The most relevant clinical signs included loss of body condition, coarse hair, depression, submandibular edema, and pale mucous membranes, with no evidence of fever, jaundice, or diarrhea. The necropsy revealed hepatomegaly, pale liver parenchyma with focal necrosis, fibrosis, cholangitis, and the presence of adult flukes in the bile ducts. Mild ascites and submandibular edema were also observed. The differential diagnosis included malignant edema, bovine leptospirosis, and severe protein deficiency; however, confirmation was made by direct identification of *F. hepatica* in the bile ducts and correlation with clinical and necroscopic findings. Treatment consisted of closantel and ivermectin, vitamin and mineral supplementation, and management measures to reduce exposure to habitats favorable to the intermediate snail (*Lymnaea* spp.). This report highlights the importance of health surveillance in rural areas of Chihuahua, the early identification of bovine fasciolosis, and the implementation of comprehensive control strategies to minimize production losses and the risk of reinfection.

Keywords: *Fasciola hepatica*, bovine, diagnosis.

RESUMEN

Se notifica la presencia de *Fasciola hepatica* en bovinos de una unidad de producción ubicada en el municipio de Madera, Chihuahua, México, caracterizada por un clima templado subhúmedo y con presencia

de cuerpos de agua temporales. El caso involucró siete animales afectados, de los cuales cuatro presentaron postración y edema submandibular, y tres murieron. Los signos clínicos más relevantes incluyeron pérdida de condición corporal, pelo hirsuto, depresión, edema submandibular y mucosas pálidas, sin evidencia de fiebre, ictericia o diarrea. La necropsia reveló hepatomegalia, parénquima hepático pálido con necrosis focal, fibrosis, colangitis y presencia de duelas adultas en conductos biliares; adicionalmente se observó ligera ascitis y edema submandibular. El diagnóstico diferencial consideró edema maligno, leptospirosis bovina y deficiencia proteica severa; sin embargo, la confirmación se realizó mediante la identificación directa de *F. hepatica* en los conductos biliares y la correlación con los hallazgos clínicos y necroscópicos. El tratamiento consistió en la administración de closantel e ivermectina, suplementación vitamínico-mineral y medidas de manejo para reducir la exposición a hábitats favorables para el caracol intermediario (*Lymnaea* spp.). Este reporte resalta la importancia de la vigilancia sanitaria en zonas rurales de Chihuahua, la identificación temprana de la fasciolosis bovina y la implementación de estrategias integrales de control para minimizar pérdidas productivas y riesgos de reinfección.
Palabras clave: *Fasciola hepatica*, bovinos, diagnóstico.

INTRODUCTION

Cattle ranching is one of the most important activities within Mexico's agricultural sector due to its significant contribution to the national supply of meat products and its role in the country's trade balance. It is the second most widespread productive activity after agriculture and is practiced across nearly the entire national territory, under a wide range of climatic conditions and using production systems adapted to each region. The cow–calf system is the most commonly used model in northern Mexico. Notably, more than half of Mexico's 196 million hectares are allocated to livestock production. In the northern region, beef cattle production primarily involves specialized European breeds (*Bos taurus taurus*), with Angus, Charolais, Hereford, and other alternative genetic lines being the most prevalent (Román-Ponce *et al.*, 2025).

The Sierra Madre Occidental, located in the municipality of Madera, Chihuahua, spans elevations ranging from 1,800 to 2,700 meters above sea level. This region is characterized by rugged topography, shallow soils, and pine–oak forest vegetation, with highland grasslands dominating the mountaintops (CONABIO, 2025). During the dry season (March to June), annual precipitation drops below 100 mm, and in some years—such as 2024 and 2025—there has been virtually no rainfall, severely limiting the availability of forage. As a result, cattle are forced to concentrate around the margins of temporary streams, scattered springs, water reservoirs, and drinking troughs supplied by the ranchers themselves (CONAGUA, 2018).

During the dry season, local hydrology is reduced to residual pools and permanent springs—shallow environments with submerged vegetation that favor the proliferation of *Lymnaea* spp. snails, which serve as intermediate hosts for *Fasciola hepatica* (Hernández-Guzmán *et al*., 2021). Bovine liver fasciolosis is a helminth infection that negatively affects productivity in extensive grazing systems located in the mountainous regions of Mexico, where reported prevalence ranges from 20% to 40%, based on serological and coproparasitological analyses (Munguía-Xóchihua *et al*., 2007; Ojeda-Robertos *et al*., 2020).

In infected cattle, *Fasciola hepatica* causes chronic liver damage, reduced weight gain, and declines in milk production, in addition to direct economic losses due to liver condemnation at slaughterhouses (Hernández-Guzmán *et al*., 2021; Ojeda-Robertos *et al*., 2020; Lan *et al*., 2024).

The present case report documents the clinical presentation, diagnosis, and management of a bovine with fasciolosis during the dry season in the Sierra de Madera, Chihuahua. The discussion addresses how the interaction of orographic, hydrological, and seasonal factors influences the transmission of F. hepatica, and proposes preventive measures adapted to high-altitude livestock production systems.

Bovine liver fasciolosis is one of the most significant parasitic diseases affecting cattle worldwide. It is primarily caused by *Fasciola hepatica*, a trematode that infects the bile ducts of the liver. This parasite has a cosmopolitan distribution, including regions with high levels of livestock production. *F. hepatica* depends on an intermediate host—a snail of the genus *Lymnaea*—whose natural habitat consists of humid ecosystems (Olsen *et al*., 2015; Mehmood *et al*., 2017).

In cattle*, Fasciola hepatica* infections can present in acute, subacute, or chronic forms, depending on factors such as parasite load, host age and physiological status, and environmental conditions. The chronic form is the most commonly observed in adult animals, and its clinical signs are generally nonspecific. These may include progressive loss of body condition, anemia, hypoproteinemia, submandibular edema (commonly known as “bottle jaw”), and reductions in daily weight gain and milk production. When parasite burdens are high, liver lesions may include cirrhotic, cholangitic, and necrotic damage, often leading to liver condemnation at slaughter, resulting in significant economic losses for cattle producers (Frias *et al*., 2023).

Liver fasciolosis causes substantial economic losses, with annual damages estimated at over 50 million USD in Latin America alone. This parasitic disease is one of the main causes of viscera condemnation at slaughter, as well as declines in productive parameters and increased treatment costs. Moreover, fasciolosis is classified as a zoonotic disease; the World Health Organization (WHO) considers it a neglected tropical parasitic disease, with more than 2.5 million people infected worldwide. It has a major impact on public health and significantly hampers economic development in rural and low-income communities of developing countries (El-Tahawy *et al*., 2017; Lan *et al*., 2024).

In Mexico, bovine liver fasciolosis is an endemic disease, primarily found in states with temperate climates and humid grazing areas, such as Jalisco, Veracruz, Michoacán, and Puebla, which present agroecological conditions favorable for the presence of intermediate snail hosts. In particular, the municipality of Madera, in the state of Chihuahua, is located at an altitude of over 2,000 meters above sea level, with a temperate sub-humid climate characterized by the presence of natural and intermittent water bodies. These conditions facilitate the presence and transmission of fasciolosis among native cattle herds raised under extensive grazing systems in the region (Hernández-Guzmán *et al*., 2021; Ojeda-Robertos *et al*., 2020).

This case report describes the occurrence of liver fasciolosis in two native beef cattle from the municipality of Madera, Chihuahua, Mexico. The report details the clinical findings, post-mortem observations, the treatment applied, and the control measures implemented. In addition, it discusses the epidemiological relevance of the infection and the active circulation of *Fasciola hepatica* within the region’s extensive cattle production system, emphasizing the public health risk posed by the parasite as a zoonotic agent at the local level.

CASE DESCRIPTION

Location and characteristics of the production unit

The cases occurred at Rancho San José, located in the municipality of Madera, Chihuahua, Mexico (27° 38′ N, 108° 07′ W), at an elevation of approximately 2,100 meters above sea level. The prevailing climate in the region is temperate sub-humid, with rainy summers, seasonal streams, and natural watercourses that irrigate local grasslands.

The ranch spans 1,460 hectares and maintains a herd consisting of 145 breeding cows, 20 heifers, and 10 bulls, including Brangus, Charolais, Hereford, and their crossbreeds. The herd is managed under an extensive grazing system with controlled breeding. The cattle diet is based primarily on native pasture, supplemented most of the year with mineralized blocks. During the dry season, due to the challenging terrain, supplementation is increased and includes forage sources such as alfalfa and oats, as well as multinutritional blocks produced by the owner.

Clinical Signs

The initial report was issued on June 1st, 2025, by the herdsman in charge of the herd, who noted the presence of four recumbent animals exhibiting submandibular edema, as well as the death of three other animals. A technical advisor conducted a physical examination on June 8th and observed loss of body condition (the affected animals had a body condition score between 3 and 5 on the 1–9 beef cattle scale), dry and rough haircoat, depression, and submandibular edema.

Respiratory and heart rates were slightly elevated, averaging 85 beats per minute (BPM) and 35 respirations per minute (RPM), respectively. The physical exam revealed hepatic pain upon palpation, mild abdominal tension, and slightly pale mucous membranes. No fever, diarrhea, or jaundice was detected in accessible mucous membranes.

The presence of *Lymnaea* spp. snails was recorded near the grazing area typically inhabited by the animals from this production unit.

Necropsy findings

Necropsies were performed on the three animals that died earlier that morning. Each procedure was initiated within six hours post-mortem, revealing the following key findings:

- Hepatomegaly was evident.
- The hepatic parenchyma appeared pale with a yellowish hue, showing focal necrotic areas and bile accumulation.
- Adhesions were observed on the Glisson’s capsule and surrounding peritoneum.
- The bile ducts were thickened and dilated, and cholangitis was present.
- Several adult parasites were detected within the biliary system (Sabatini *et al.*, 2023).

In other organs and systems, the only relevant findings were mild ascites and submandibular edema.

Differential diagnoses

The clinical presentation observed in the affected cattle was consistent with several possible differential diagnoses (Alvarado *et al.*, 2021):

a) Malignant edema. This disease is caused primarily by *Clostridium septicum*, although other species of the same genus such as *C. chauvoei, C. septicum, C. perfringens*, and *C. novyi* may also be involved. It is characterized by an acute onset of clinical signs. The main sign it shares with bovine fasciolosis is the possible presence of submandibular edema. However, it can be distinguished by additional signs such as high fever and localized swelling in muscle tissue. Furthermore, the edema is typically associated with a suppurative wound and crepitus around the lesion site.

b) Bovine leptospirosis. This bacterial disease is mainly caused by *Leptospira interrogans* serovar Hardjo, although other leptospires such as *L. icterohaemorrhagiae* and *L. pomona* may also be involved. Clinical signs that may resemble fasciolosis include jaundice, but leptospirosis can be differentiated by the presence of additional signs such as hemoglobinuria, marked fever, abortions in pregnant animals, and renal involvement (e.g., azotemia).

c) Severe protein deficiency. Severe hypoproteinemia in cattle is rarely observed and is generally associated with extreme malnutrition and/or heavy intestinal parasitism. The main clinical manifestations include submandibular edema and ascites in the abdominal cavity. However, although the affected animals in this case exhibited mild loss of body condition, it was not severe enough to explain the presence of submandibular edema solely as a result of protein deficiency.

Definitive diagnosis

Based on the clinical findings, necropsy lesions, the confirmed presence of *Fasciola hepatica* within the bile ducts, and the absence of fever or any other signs suggestive of alternative pathologies, the diagnosis of bovine fasciolosis was confirmed (Sabatini *et al.*, 2023; Godinho *et al*., 2025).

Treatment, management recommendations and prevention

Due to the remote location of the production unit and the resulting limited access to veterinary pharmacies, a combination formulation based on Closantel and Ivermectin, enriched with vitamins A, D, E, and B12, was selected for treatment. The formulation contained: Ivermectin 2.0 g, Closantel 10.0 g, vitamin A 8,000,000 IU, vitamin D_3 1,500,000 IU, vitamin E 1,000 IU, vitamin B_{12} 20 mg, with a total volume of 100 mL. A

single dose of 1 mL per 100 kg of live weight was administered (Geurden *et al.,* 2012; Babják *et al.,* 2021; Kahl *et al.,* 2023; Gedefaw *et al*., 2025).
Additionally, mineral and vitamin supplementation was recommended using an injectable product consisting of two solutions:

- Solution A: Copper (as edetate) 1 g; Zinc (as edetate) 4 g; Manganese (as edetate) 1 g; Selenium (as sodium selenite) 0.5 g; excipients q.s. 100 mL.
- Solution B: Vitamin A palmitate 3.5 g; Vitamin E acetate 5.0 g; excipients q.s. 100 mL.

The purpose of this supplementation was to support recovery of body condition. Additionally, access to flooded areas and riparian vegetation along streams was restricted in order to reduce the risk of reinfection (El-Tahawy *et al*., 2017; Lan *et al.,* 2024).

Clinical monitoring and progress

Post-treatment monitoring was carried out on days 7 and 14. During these evaluations, no signs of hepatic pain, submandibular edema, or rough hair coat were detected. The animals exhibited progressive improvement in body condition, indicating a favorable response to the therapeutic intervention.

DISCUSSION

Bovine fasciolosis is a parasitic disease with wide global distribution and major significance in regions where ecological conditions favor the development of the *Fasciola hepatica* life cycle—namely temperate, humid climates with the presence of intermediate hosts, such as snails of the genus *Lymnaea*. The present case, documented in the municipality of Madera, Chihuahua, aligns with reports from other regions of Mexico, where the combination of seasonal water flows and grazing areas facilitates the transmission of this trematode.
The clinical signs observed in the affected animals—submandibular edema, loss of body condition, rough hair coat, and pale mucous membranes—are characteristic of the chronic phase of fasciolosis. These symptoms are associated with hypoproteinemia and anemia, resulting from chronic liver damage and the hematophagous activity of the parasite. The absence of fever, diarrhea, or jaundice in accessible mucous membranes is consistent with the clinical profile typically described for *F. hepatica*, and helps distinguish it from other acute diseases such as leptospirosis or malignant edema (Sabatini *et al.*, 2023; Godinho *et al.,* 2025).

The necropsy findings observed in the animals that died during the course of the disease—hepatomegaly, hepatic fibrosis, cholangitis, focal necrosis, and the presence of adult stages of Fasciola hepatica in the bile ducts—are consistent with those described in similar case reports. Previous studies indicate that the most common gross

pathological lesions associated with this parasitosis include bile duct thickening, the presence of adult parasites, and fibrosis of the hepatic parenchyma. The additional observation of ascites and submandibular edema further supports the association with chronic hypoproteinemia, one of the most frequent systemic effects of this disease (Drescher *et al.,* 2023).

The diagnostic process included the consideration of differential diagnoses such as malignant edema, bovine leptospirosis, and severe protein deficiency. However, the clinical course without fever, the absence of hemoglobinuria or abortions, and the direct identification of Fasciola hepatica in the bile ducts effectively ruled out these alternative possibilities. This clinicopathological approach, adopted due to the lack of immediate access to diagnostic laboratories and advanced tools—a result of the remote location of the production unit—highlights the critical value of post-mortem findings for confirming fasciolosis and differentiating it from other pathologies that also present with submandibular edema (Munita *et al.,* 2019; Drescher *et al.,* 2023).
The treatment administered—closantel combined with ivermectin, along with vitamin and mineral supplementation—is consistent with current recommendations for the control of bovine fasciolosis. However, it is important to consider the strategic use of other formulations capable of targeting both adult and juvenile stages of the parasite. Such treatments must be implemented with careful timing and rotation to prevent the development of anthelmintic resistance and to maintain the long-term effectiveness of control programs. Likewise, restricting cattle access to waterlogged areas and reducing contact with the intermediate snail host are essential management measures to minimize reinfection rates (Geurden *et al.,* 2012; Babják *et al.,* 2021; Kahl *et al.,* 2023; Gedefaw *et al*., 2025).

From an epidemiological perspective, this report—being the first documented case with clinical and post-mortem evidence—sets a precedent for recognizing the importance of parasitic disease surveillance in cattle-producing regions of Chihuahua, where the presence of temporary water bodies represents a risk factor for *F. hepatica* transmission. This situation is partly explained by the fact that, for many livestock producers and veterinary practitioners in the region, the presence of this disease is uncommon or even unknown. Combined with the geographic isolation of bovine production units and their limited access to diagnostic laboratories, this lack of awareness can lead to misdiagnosis or underreporting of fasciolosis cases (Olsen *et al.*, 2015; Takeuchi-Storm *et al*., 2017; El-Tahawy *et al*., 2017).

CONCLUSIONS

This case report confirms the active circulation of *Fasciola hepatica* in cattle from the municipality of Madera, Chihuahua, and highlights the epidemiological relevance of local environmental conditions—such as the temperate sub-humid climate and the presence

of temporary water bodies—as key risk factors for disease transmission. Due to the remote location and limited accessibility of the production unit, access to diagnostic laboratories was not feasible. Therefore, the case was approached through a clinicopathological evaluation, where the physical examination of symptomatic animals, along with necropsy findings, were essential for establishing a definitive diagnosis, allowing differentiation of fasciolosis from other conditions with similar clinical manifestations, such as malignant edema, bovine leptospirosis, or severe protein deficiency.

This case also emphasizes the importance of implementing comprehensive control strategies that include the appropriate use of fasciolicides, vitamin–mineral supplementation to improve body condition, and management measures aimed at reducing cattle exposure to habitats that favor the parasite's life cycle, such as flooded areas or riparian vegetation. The documentation of this episode underscores the need to strengthen sanitary surveillance in rural regions of Chihuahua and to promote the training of livestock producers and local veterinarians, since early detection and preventive management are essential for minimizing production losses and avoiding misdiagnosis in regions where fasciolosis is underreported.

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