HEPATOGENOUS PHOTOSENSITIZATION OUTBREAK IN CATTLE ASSOCIATED WITH *UROCHLOA SPP.* INGESTION IN SOUTHEASTERN RIO GRANDE DO SUL, BRAZIL

HEPATOGENOUS PHOTOSENSITIZATION OUTBREAK IN CATTLE ASSOCIATED WITH UROCHLOA SPP. INGESTION IN SOUTHEASTERN RIO GRANDE DO SUL, BRAZIL

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ABSTRACT

Hepatogenous photosensitization is a non-infectious toxic disease affecting ruminants in several regions of Brazil, mainly caused by the ingestion of grasses of the genus *Urochloa* spp. (syn. *Brachiaria* spp.). These plants contain lithogenic steroidal saponins that induce cholangiopathic lesions and phylloerythrin retention, resulting in photosensitive dermatitis in non-pigmented areas. This study aimed to report an outbreak of hepatogenous photosensitization in cattle associated with *Urochloa* spp. ingestion on a farm in Turuçu, southern Rio Grande do Sul, Brazil. Eleven cases were recorded, with a case fatality rate of 45%. Clinically, affected animals showed ulcerative skin and tongue lesions, desquamation of the labial mucosa, epiphora, and brisket edema. Grossly, the liver was enlarged and yellowish, and histopathology revealed hepatocellular vacuolation and bile pigment accumulation consistent with cholestasis. No birefringent crystals were observed. The clinicopathological findings confirmed hepatogenous photosensitization secondary to *Urochloa* spp.. Ingestion. This report expands the geographic occurrence of the disease in southern Brazil and emphasizes the importance of monitoring pastures to prevent further outbreaks.

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Keywords: cattle, cholestasis, photosensitive dermatitis, toxic plants, steroidal saponins.

RESUMO

A fotossensibilização hepatógena é uma enfermidade tóxica não infecciosa que acomete ruminantes em diversas regiões do Brasil, sendo causada principalmente pela ingestão de gramíneas do gênero *Urochloa* spp. (sin. *Brachiaria* spp.). Essas plantas contêm saponinas esteroidais litogênicas capazes de induzir lesões colangiopáticas e retenção de filoeritrina, resultando em dermatite fotossensível em áreas despigmentadas. Este estudo teve como objetivo descrever um surto de fotossensibilização hepatógena em bovinos associado ao consumo de *Urochloa* spp. em uma propriedade localizada no município de Turuçu, região sul do estado do Rio Grande do Sul, Brasil. Foram observados onze casos, com mortalidade de 45%. Clinicamente, os animais apresentaram lesões ulcerativas na pele e língua, descamação da mucosa labial, epífora e edema de barbela. À necropsia, verificou-se hepatomegalia com coloração amarelada, enquanto a histopatologia revelou vacuolização citoplasmática dos hepatócitos e acúmulo de pigmento biliar, compatíveis com colestase. Cristais birrefringentes não foram observados. Os achados clínico-patológicos confirmam o diagnóstico de fotossensibilização hepatógena secundária à ingestão de *Urochloa* spp. O estudo amplia o registro geográfico dessa intoxicação na região sul do Brasil e destaca a necessidade de monitoramento das pastagens para prevenção de novos surtos.

Palavras-chave: bovinos, colestase, fotodermatite, plantas tóxicas, saponinas esteroidais.

1 INTRODUCTION

Photosensitization is a non-infectious toxic disease that affects several species of ruminants and equids, including sheep. It is characterized by an exaggerated cutaneous reaction to sunlight in non-pigmented or poorly haired areas due to the accumulation of photodynamic compounds in the systemic circulation (Riet-Correa & Medeiros, 2001). In ruminants, the most common form is hepatogenous photosensitization, which results from liver damage that impairs the normal excretion of phylloerythrin, a pigment derived from chlorophyll metabolism in the rumen (Scheie et al., 2002; Quinn et al., 2014).

In Brazil, the main cause of hepatogenous photosensitization is the ingestion of grasses of the genus *Urochloa* spp. (synonym: *Brachiaria* spp.), which are widely cultivated in pastures owing to their hardiness and high forage value, covering approximately 95 million hectares (Ferraz, 2003; Brum et al., 2009). Despite their zootechnical importance, these plants contain lithogenic steroidal saponins, such as

protodioscin, which can induce cholangiopathic lesions and the accumulation of birefringent crystals in the bile ducts, characterizing crystal-associated cholangiopathy (Cruz et al., 2000; Brum et al., 2009; Souza et al., 2010).

Outbreaks occur throughout the year, in both dry and rainy seasons, with morbidity ranging from 0.2% to 50%, and case fatality rates reaching up to 100% of affected animals (Souza et al., 2010). The clinical picture is characterized by photodermatitis, brisket edema, jaundice, progressive emaciation, and, in some cases, a chronic course with wasting syndrome without evident skin lesions (Riet-Correa et al., 2002; Cardona-Álvarez et al., 2015).

Given the relevance of this disease to Brazilian livestock production and the economic impacts associated with decreased productivity and animal mortality, the present study aimed to report an outbreak of hepatogenous photosensitization in cattle associatedd with the ingestion of *Urochloa* spp., describing its epidemiological, clinical, and pathological aspects.

2 CASE REPORT

Eleven sporadic episodes of *Urochloa* spp. (syn. *Brachiaria spp.*) intoxication was recorded on a rural property housing 211 cattle, resulting in the death of five animals. The cases occurred in late November 2024 in the municipality of Taruçu, state of Rio Grande do Sul, Brazil. The animals were maintained on exclusive *Urochloa* spp. pastures during the period of the outbreak (Figure 1).

Figure 1. Hepatogenous ph otosensitization associated with *Urochloa spp.* ingestion. Cattle grazing on pastures predominantly composed of *Urochloa spp.*
Source: Authors (2025).

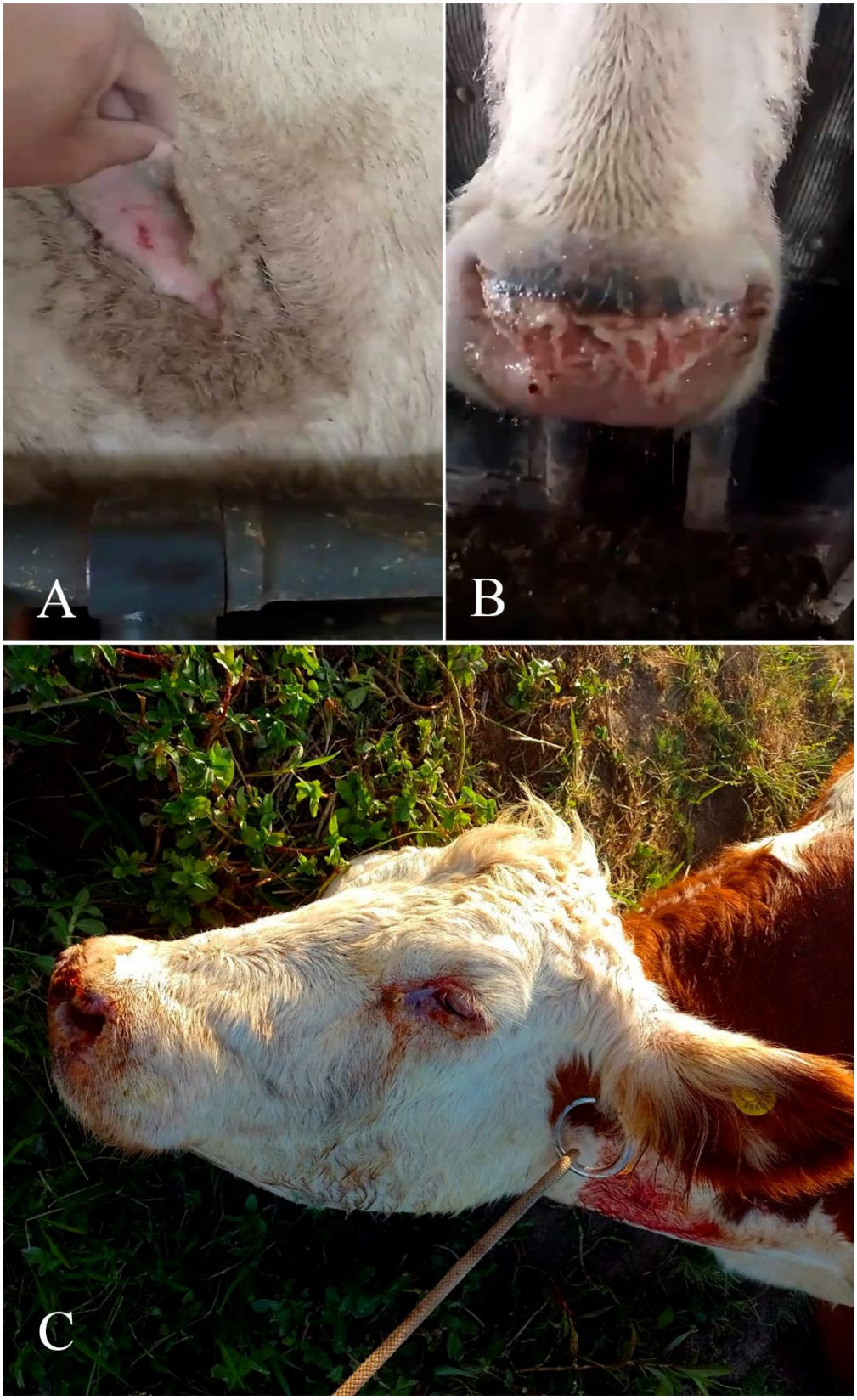

Figure 2. Hepatogenous photosensitization associated with *Urochloa spp.* ingestion. Affected cattle showing (A) ulcerative and crusted skin lesions in non-pigmented areas, (B) Desquamation of the labial mucosa, and (C) epiphora and periocular dermatitis.
Source: Authors (2025).

Clinically, the affected cattle exhibited ulcerative lesions on the skin and tongue, epiphora, and desquamation of the labial mucosa (Figure 2 A, B, and C).

Three animals were subjected to necropsy. At necropsy, there was moderate cachexia, a rough and dull hair coat, and brisket edema. The skin showed dry, cracked areas with erythema, erosions, and extensive ulcers associated with crust formation in lightly pigmented regions. The liver was enlarged, with rounded borders and yellow discoloration (Figure 3 A and B). No significant alterations were observed in any other organs.

Figure 3. Hepatogenous photosensitization associated with *Urochloa spp.* ingestion. The liver was enlarged with rounded borders and diffuse yellow discoloration (A). On the cut surface, yellow discoloration was more prominent (B).
Source: Authors (2025).

Samples from all tissues were collected and fixed in 10% neutral-buffered formalin for histopathological examination. Histologically, the liver showed hepatocytes with finely vacuolated cytoplasm and bile pigment accumulation, which was consistent with cholestasis (Figure 4). No relevant histological alterations were observed in other examined tissues.

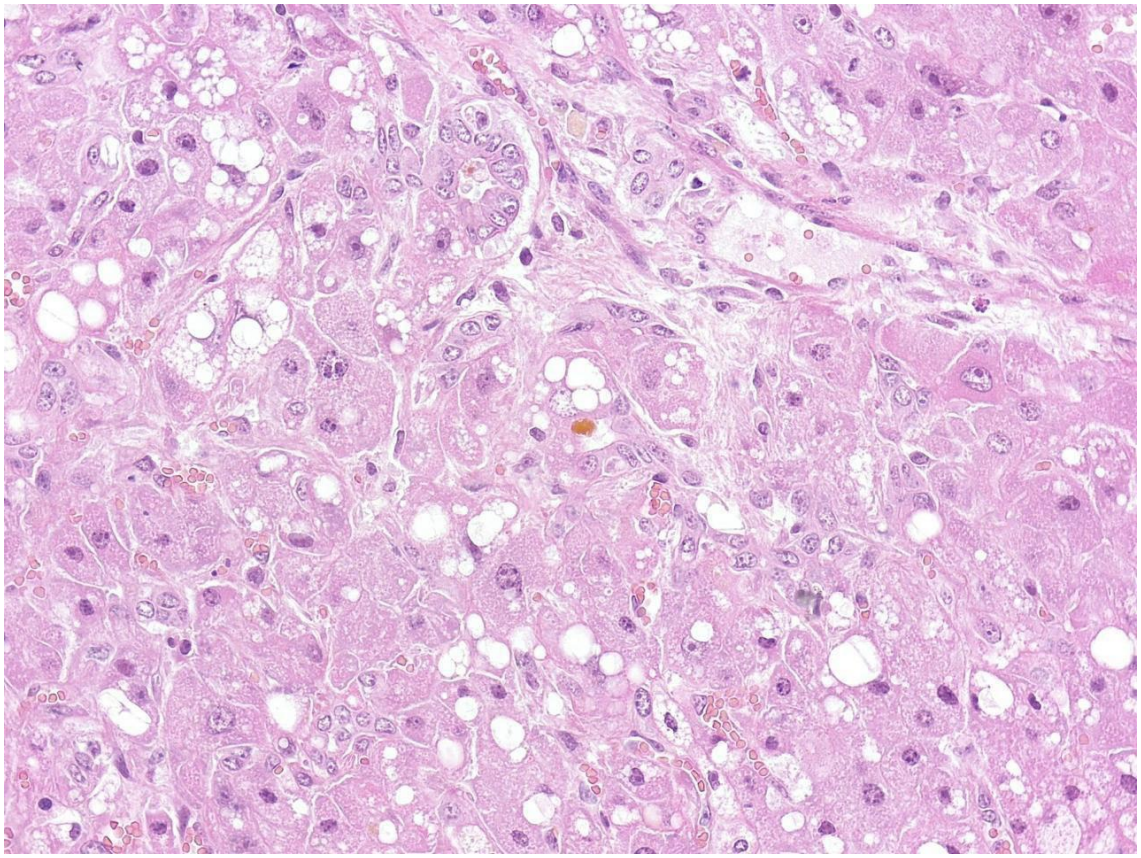

Figure 4. Hepatogenous photosensitization associated with *Urochloa spp.* ingestion. Hepatocytes showing finely vacuolated cytoplasm and accumulation of bile pigments.
Source: Authors (2025).

3 DISCUSSION

Outbreaks of hepatogenous photosensitization in cattle associated with the ingestion of *Urochloa spp.* (syn. *Brachiaria spp.*) have been widely documented in severall Brazilian regions and represent one of the most important non-infectious causes of hepatic disease in grazing ruminants (Souza et al., 2010; Kono et al., 2022). These grasses are extensively cultivated because of their high adaptability and nutritional value, occupying approximately 95 million hectares of pastures in Brazil (Brum et al., 2009). Although they are essential to the livestock industry, certain *Urochloa* species contain lithogenic steroidal saponins capable of inducing hepatobiliary injury, leading to phylloerythrin retention and subsequent photosensitization (Cruz et al., 2000; Cruz et al., 2001; Riet-Correa & Medeiros, 2001).

The present outbreak occurred in southern Brazil, a region where such intoxications are less commonly reported than in the Midwest and Northeast. Similar epidemiological characteristics have been described in *Brachiaria decumbens*

outbreaks in Mato Grosso do Sul (Souza et al., 2010) and in *B. brizantha* and *B. ruziziensis* outbreaks in Paraná (Kono et al., 2022), confirming that intoxication can occur under various climatic conditions and throughout the year. The morbidity observed in this case (≈5%) and the high lethality (45%) are consistent with previous reports, which indicate morbidity rates ranging from 0.2% to 50% and fatality rates of up to 100% (Souza et al., 2010).

Several factors can influence the occurrence of *Urochloa*-associated toxicosis, including the exclusive use of single-species pastures, plant developmental stage, and environmental conditions (Brum et al., 2009). The accumulation of steroidal saponins, mainly protodioscin, tends to increase during plant maturation and seed-fall stages, which may correspond to the period of this outbreak (Brum et al., 2009). These saponins are biotransformed into sapogenins in the rumen, which precipitate with bile salts, forming insoluble crystals responsible for cholangiopathy and bile retention (Cruz et al., 2000; Cruz et al., 2001). However, in this case, birefringent crystals were not observed histologicallyy, a finding that may be related to the stage of lesion development or the involvement of less toxic *Urochloa* species (Kono et al., 2022). The hepatic lesions observed, vacuolization and accumulation of bile pigments, were consistent with hepatocellular cholestasis, indicating the chronicity of the process.

Clinically, the animals presented with ulcerative and desquamative lesions on non-pigmented skin and mucosa, mainly on the lips and tongue, in addition to epiphora and brisket edema. These lesions are typical of hepatogenous photosensitization, as reported in Zebu calves grazing *Brachiaria decumbens* in Colombia (Cardona-Álvarez et al., 2015) and cattle from northeastern Brazil (Carmo, 2018). Hepatomegaly with yellow discoloration is consistent with the cholestatic process described in previous outbreaks (Souza et al., 2010; Riet-Correa et al., 2002). Histologically, the absence of necrosis and the predominance of hepatocellular vacuolation and bile stasis suggest a subacute to chronic evolution, which is compatible with ongoing saponin-induced cholangiopathy (Kono et al., 2022).

The pathogenesis of hepatogenous photosensitization is based on the accumulation of phylloerythrin, a photodynamic metabolite derived from the bacterial degradation of ruminal chlorophyll. In healthy animals, phylloerythrin is conjugated in the liver and efficiently excreted through bile. However, when hepatic excretory function is impaired, the pigment accumulates in the bloodstream and is deposited in the skin,

leading to skin pigmentation. Upon exposure to ultraviolet radiation, phylloerythrin acts as a photosensitizer, generating reactive oxygen species that induce oxidative and cytotoxic injuries to epidermal keratinocytes (Scheie Et Al., 2002; Riet-Correa & Medeiros, 2001). The resulting dermatitis is typically restricted to non-pigmented and sparsely haired skin, where the absence of melanin and reduced hair coverage enhance ultraviolet penetration and tissue damage (nupp, 2016).

The differential diagnosis of hepatogenous photosensitization includes primary photosensitization caused by *Ammi majus*, *Froelichia humboldtiana*, and *Hypericum perforatum* (Knupp, 2016), and toxicosis by *Lantana camara* or *Pithomyces chartarum* (Cardona-Álvarez et al., 2015). In the present outbreak, the exclusive grazing of *Urochloa spp.*, the absence of other hepatotoxic plants, and the histological findings of cholestasis without necrosis support the diagnosis of hepatogenous photosensitization secondary to *Urochloa* spp. ingestion.

The economic impact of this condition is considerable, leading to decreased productivity, weight loss, carcass condemnation, and, in severe cases, animal death (Souza et al., 2010; Kono et al., 2022). Preventive measures should focus on pasture management, such as the rotation and resting of *Urochloa* areas, especially during regrowth or flowering periods when saponin levels are higher (Brum et al., 2009). Providing shaded areas and alternative forages can reduce exposure to sunlight and toxic compounds (Riet-Correa & Medeiros, 2001).

In summary, this report expands the geographic occurrence of hepatogenous photosensitization associated with *Urochloa spp.* ingestion in the southern region of Brazil. The absence of birefringent crystals in this outbreak reinforces that hepatic lesions and clinical signs may occur even without visible crystal deposition, highlighting the need for further studies correlating saponin concentrations with clinical outcomes. Continuous monitoring of *Urochloa* pastures and experimental analyses of their phytochemical profiles are essential for understanding regional variations in toxicity and preventing future outbreaks.

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BIOETHICS AND BIOSECURITY COMMITTEE APPROVAL

We, the authors of the article entitled “Hepatogenous photosensitization outbreak in cattle associated with *Urochloa spp.* ingestion in Southeastern Rio Grande do Sul, Brazil” for all intents and purposes, declare that the project that gave rise to its data was not submitted to the Ethics Committee for evaluation. However, we are aware of the provisions of the resolutions of the Conselho Nacional de Controle de Experimentação Animal - CONCEA (https://www.gov.br/mcti/pt-br/composicao/conselhos/concea) for projects involving animals. Therefore, the authors assume full responsibility for the data presented herein and are available to answer any questions should they be required by the competent authorities.

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