

Successful Medical Management of Secondary Photosensitization in A Crossbred Holstein Friesian Cow – A Case Report

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How to cite this paper

Saravanan, M., Keerthana, R., Ramkumar, P. K., Veeraselvam, M., Yogeshpriya, S. and Karthika, K. & Jayalakshmi K.³(2024). **Successful Medical Management of Secondary Photosensitization in A Crossbred Holstein Friesian Cow – A Case Report.** *International Journal of Livestock Research*, 14 (9), 27-30.

Received : Aug 10, 2024
Accepted : Sep 02, 2024
Published : Sep 30, 2024

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Abstract

Photosensitization is not uncommon in cattle, due to the accumulation of photodynamic agents in the skin which is triggered by direct sunlight and developing skin lesions like alopecia, itching, hyperemic, ulceration, and necrosis. A five-year-old crossbred HF cow was brought to the Veterinary Clinical Complex, VCRI Orathanadu with a history of redness, ulceration, and necrosis of the skin on the dorsum, perineum, and face for the past twenty days. Clinical examination revealed dullness, lethargy, reduced feed intake, severe hyperemia, ulceration, and necrosis of the skin on the dorsal aspect (from neck to tail), perineum, and face. Hematology revealed mild anemic and elevated liver enzymes. The animal was restricted from the regular grazing area and contact with direct sunlight. Treated with IV Fluids, Inj. Streptopenicillin @ 2.5 g I/M, Inj. Meloxicam @0.5 mg/kg I/M, Inj. Chlorpheniramine maleate @ 0.4 mg/kg I/M, Inj. B complex with liver extract @ 10ml I/M and Inj. Vit AD3E @10 ml I/M. Supportive Liver tonic and Cetrimide cream on topical application. The animal showed clinical improvement from the second week and complete recovery was reported after three months.

Keywords: Cattle, Liver Supportive, Photodynamic Agents, Photosensitization.

Introduction

Photosensitization is characterized by an abnormal sensitivity of the skin by sunlight due to the presence of photodynamic molecules in the dermal tissues and peripheral circulation (Quinn *et al.*, 2014). Photosensitivity in cattle is multi-etiology origin and resulting severe dermatitis on unpigmented areas of skin. Photodynamic agents accumulate in body and are triggered in skin in the presence of sunlight, eventually resulting in DNA degradation upon excitation with UV and/or visible light (Yamoriet *et al.*, 2011; Smith *et al.*, 2012). It can occur within minutes of exposure to the toxic substance by direct contact, within hours (via contact or ingestion) of deposition of the primary photosensitizing agents or days after exposure due to activation of secondary photosensitization followed by liver damage and deposition of phorphyrin into skin (Patel *et al.*, 2022). Similarly, the present of case was recorded in cross breed HF cattle due to secondary photosensitization and discussed in details.

Case Presentation and Observation

Five years old cross breed HF cow was brought to the Veterinary Clinical Complex, VCRI Orathanadu with the history of pursuits, redness, ulcerated and necrosis of the skin on the dorsum, perineum and face for the past twenty days. The animal was in free ranging practice. Clinical examination revealed dullness, lethargic, reduced feed intake, severely hyperemic, ulcerated and necrosis of the skin on dorsal aspect (from neck to tail), perineum and face were noticed (Fig 1). The vital parameters were found to be normal. Animal exhibited pain sensation on dorsal aspect skin (hyperemic area) even with gentle touch. Blood samples were collected for complete blood count and serum biochemical analysis. Skin scrapping was collected to rule out ectoparasitic infection.

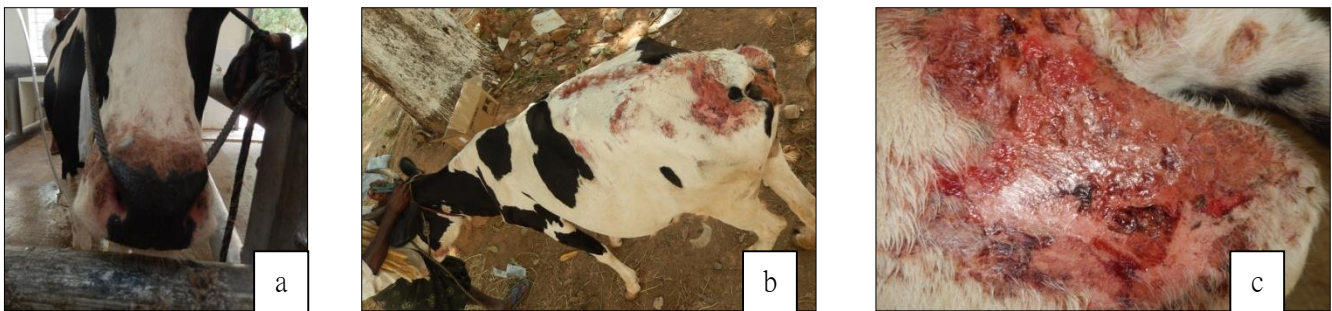


Fig. 1 Redness in face (a), hyperemic dorsum (b), ulcerated and necrosis (c) of the skin on dorsal aspect (from face to tail and perineum) before treatment

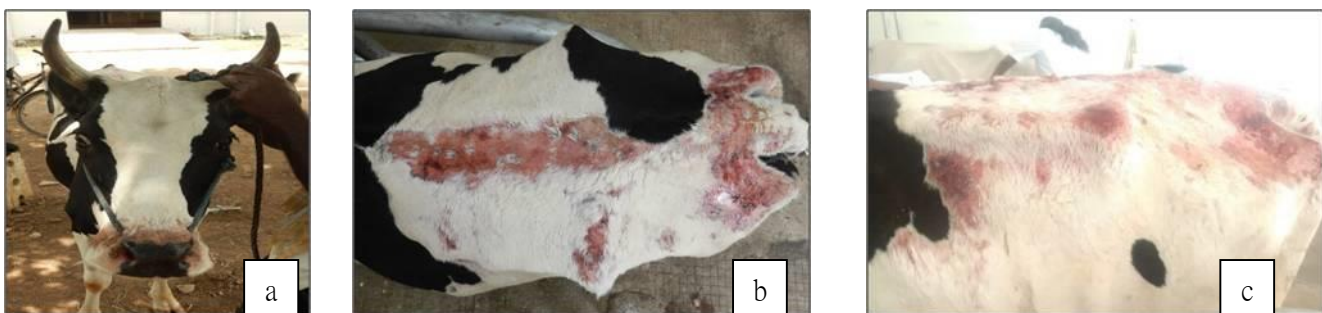


Fig 2 Reduction of Redness in face (a) hyperemia (b), ulceration and necrosis (c) of the skin on dorsal aspect after 20 days of treatment



Fig 3 Complete recovery from photosensitization - face (a), dorsum (b) and back after 3 month of treatment

Table 1: Hemato-biochemical changes before and after treatment

S. No	Parameters	Before treatment (Day 0)	After treatment (Day30)
1.	Hb (g/dl)	9.0	9.8
2.	PCV (%)	28	31
3.	WBC (Cells/cmm)	17300	8750
4.	AST (U/L)	352	95
5.	ALT (U/L)	268	52
6.	BUN (mg/dl)	26	25
7.	Creatinine (mg/dl)	1.5	1.4
8.	Bilirubin (mg/dl)	0.9	0.5
9.	Total protein (g/dl)	6.2	6.3
10.	Albumin (g/dl)	2.8	3.2

Hematology revealed mild anemic and elevated liver enzymes (Table 1). Animal was restricted to regular area and also from direct sunlight. Animal was treated with intravenous fluid therapy to eliminate stored metabolites from the circulation along with Inj. Streptopenicillin @ 2.5 g I/M 5 days, Inj. Meloxicam @0.5 mg/kg IM 3 days, Inj. Chlorpheniramine maleate @ 0.4 mg/kg IM 5 days, Inj. B complex with liver extract @ 10ml IM5 days and Inj. Vit AD₃E @10 ml IM for 5 days followed with oral liver tonic and Cetrimide cream for topical application and treatment were continued for 1 month. Animal showed clinical improvement from second week (Fig 2) onwards and complete recovery was reported after three months (Fig 3).

Discussion

Photosensitivity reactions in cattle occur when light reactive plant components (called phototoxins) enter the skin and are exposed to ultraviolet light. The phototoxin reacts to UV in light colored or thin-skinned or hairless areas such as around the eyes, nose or teats. Phylloerythrin, a chlorophyll degradation product released by rumen microbial digestion and excreted in the bile, could accumulate in the circulation when excretion was impaired due to hepatic dysfunction or bile injury. This accumulation could lead entry into the small vessels of the skin which resulting in increased sensitivity to sunlight (Constable *et al.*, 2017).

Anton and Solcan (2022) reported a case of secondary photosensitization in a pregnant Holstein cow, attributed to impaired bile flow and hepatic function resulting from an *Anaplasma* spp infection. In hepatogenous photosensitization, the impaired liver function leads to extremely high levels of phylloerythrin in the blood, which allows the metabolites to act as a photodynamic agent. Similarly, in the present case also elevated liver enzymes were recorded. This could support the photosensitization associated with hepatic damage. Where, Scott (2018) who stated that determining the underlying cause of photosensitization quite challenging.

In the present cases physical examination of this cow revealed lesions exclusively on areas of non-pigmented skin with alopecia, itching, hyperemic and necrosis. These observations correlated with Carmo *et al.* (2021) who reported that the primary clinical signs were apathy, anorexia, edema, itching, keratitis, extensive skin scabs, dehydration and jaundice.

Serum biochemistry was an effective means of assessing hepatic impairment and potential secondary lesions, Thus, hepatogenous photosensitization should be included in the differential diagnosis for adult cattle presenting with skin

lesions, reduced appetite, and jaundice (Carmoet *al.*, 2021). Aboling and Moritz (2023) reported that a significantly higher incidence of secondary photosensitization occurs only under conditions of poor feed quality. Further author suggested that, in addition to phototoxic plants, liver-toxic bacteria and fungi could also contribute to the increased incidence of secondary photosensitization.

Conclusion

According to the previous authors literatures and finding of the present case, diagnosed as secondary photosensitization based on the free ranging grazing practice, typical clinical skin lesions, elevated liver enzymes and clinical recovery by liver protectant with supportive.

Acknowledgement

The Authors are grateful to the Dean VCRI Orathanadu and the Professor and Head, VCC, VCRI Orathanadu for all the facilities provided for carrying out this study

Contribution by Authors

All co-authors contributed equally.

Conflict of Interests

There is no conflict of interest.

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