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## Cutaneous squamous cell carcinoma in a multiparous Holstein Friesian crossbred cow: A case report

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### Abstract

Cutaneous squamous cell carcinoma (SCC) is a locally invasive, keratinocyte-derived malignant neoplasm that most commonly affects the non-pigmented, sparsely haired and sun-exposed skin of ageing cattle. This report describes a case of cutaneous SCC in a nine-year-old, third-calving Holstein Friesian (HF) crossbred cow that presented with multiple, slowly progressive, crusted and nodular proliferative growths over the dorsal thoraco-lumbar region of more than one year's duration. On clinical examination, the lesions were firm, irregular, cauliflower-like masses covered with thick, dark, keratinous crusts, some of which were ulcerated and exuded a serosanguineous discharge. Representative incisional biopsies were collected, fixed in 10 per cent neutral buffered formalin and processed routinely for histopathology. Haematoxylin and eosin (H&E) stained sections revealed proliferating neoplastic squamous epithelial cells arranged as invasive nests and cords within the dermis, individual cell keratinization, numerous well-formed concentric keratin pearls with associated mitotic figures, and marked nuclear atypia with prominent, occasionally multiple, nucleoli, confirming a diagnosis of well-differentiated cutaneous squamous cell carcinoma. The case highlights the diagnostic value of histopathology in confirming clinically suspected cutaneous neoplasms in cattle and underscores the need for periodic skin examination and early biopsy-based diagnosis in ageing, light-skinned dairy crossbred cattle maintained under prolonged solar exposure.

**Keywords:** Cattle, HF crossbred, cutaneous squamous cell carcinoma, keratin pearl, histopathology, dorsum

### Introduction

Squamous cell carcinoma is one of the most frequently reported cutaneous malignancies in cattle, arising from the keratinocytes of the epidermis and its adnexal structures. It is best documented in its ocular and periocular form (bovine ocular squamous cell carcinoma), which is regarded as the most common malignant tumour of cattle in many parts of the world, but the tumour can also arise from any lightly pigmented, hair-sparse skin surface subjected to chronic solar irradiation, including the vulva, perineum, muzzle, eyelids and, less commonly, the dorsal trunk. Predisposing factors implicated in the pathogenesis of bovine cutaneous SCC include prolonged ultraviolet radiation exposure, lack of protective skin pigmentation, advancing age, chronic mechanical or actinic irritation, nutritional and immune status, and viral cofactors such as bovine papillomavirus. Holstein Friesian and Hereford breeds and their crosses, which characteristically possess unpigmented or partially pigmented skin, are considered more susceptible than indigenous zebu breeds.

Grossly, the tumour begins as a plaque or keratoma that progresses through a papilliferous stage to a frankly invasive, proliferative and often ulcerated carcinomatous mass; secondary bacterial infection and myiasis are common complications of neglected lesions. Definitive diagnosis rests on histopathological demonstration of invasive squamous epithelial nests, individual cell keratinization, keratin pearl formation and variable nuclear atypia, which also permit histological grading (well, moderately or poorly differentiated, and anaplastic) that carries prognostic significance. This report describes the clinical presentation, gross and histopathological features of a cutaneous squamous cell carcinoma affecting the dorsal trunk of a multiparous HF crossbred cow.

### Case History and Clinical Examination

A four year-old, third-calving Holstein Friesian crossbred pregnant cow in its second month of lactation was presented with a history of multiple, slowly enlarging growths over the back that the owner had first noticed more than a year earlier. The lesions had progressively increased in number and size, occasionally bled on contact and were associated with a foul odour. The animal was otherwise active, with normal appetite, rumination and milk yield, and there was no history of similar lesions in other herd mates.

On clinical examination, multiple firm, broad-based, irregular, nodular to cauliflower-like proliferative growths, ranging from approximately 1 to 4 cm in diameter, were observed over the dorsal thoracic and lumbar region (withers to back). The lesions were covered by thick, dark reddish-brown to blackish, adherent keratinaceous crusts; some nodules were raised and partially pedunculated with an ulcerated, friable surface exuding serosanguineous fluid (Fig. 1 and Fig. 2). The surrounding skin showed mild alopecia and hyperkeratosis. Regional (prescapular and precrural) lymph nodes were not palpably enlarged. Rectal temperature, heart rate, respiratory rate and rumen motility were within normal physiological limits, and the animal was in fair body condition. After surgical removal of the growth, it was grown aggressively.

### Materials and Methods

Based on the clinical presentation, a provisional diagnosis of cutaneous neoplasia was made and representative incisional biopsy specimens were collected from the periphery of the lesions under local infiltration anaesthesia with 2 per cent lignocaine hydrochloride. The tissue samples were immediately fixed in 10 per cent neutral buffered formalin, processed routinely through graded alcohols and xylene, embedded in paraffin wax, sectioned at 4-5  $\mu$ m thickness and stained with haematoxylin and eosin (H&E) for histopathological examination.

### Histopathological Findings

Histopathological examination of H&E-stained sections revealed sheets and nests of proliferating neoplastic squamous epithelial cells extending from the epidermis into the underlying dermis, separated by thin fibrovascular stromal septae (Fig. 3). The neoplastic cells were polygonal to round, possessed abundant eosinophilic cytoplasm with distinct intercellular bridges, and exhibited marked nuclear atypia with vesicular, pleomorphic nuclei and prominent, occasionally multiple, nucleoli (Fig. 4). Numerous well-formed, concentrically laminated keratin pearls were noted within the tumour cell nests, frequently accompanied by adjacent mitotic figures, indicating active tumour proliferation (Fig. 5). Individual cell keratinization (dyskeratosis), characterised by scattered cells with intensely eosinophilic, glassy cytoplasm undergoing premature keratinization, was also a consistent finding (Fig. 6). A mild to moderate peritumoural lymphocytic infiltrate was present within the stroma. Based on the abundant keratin pearl formation and predominance of well-organised tumour cell nests, the lesion was graded as a well-differentiated cutaneous squamous cell carcinoma.



**Fig 1:** Close-up view of the dorsal skin lesion showing multiple crusted, nodular, partly ulcerated proliferative masses.



**Fig 2:** Affected HF crossbred cow showing multiple crusted nodular growths distributed along the withers and back.

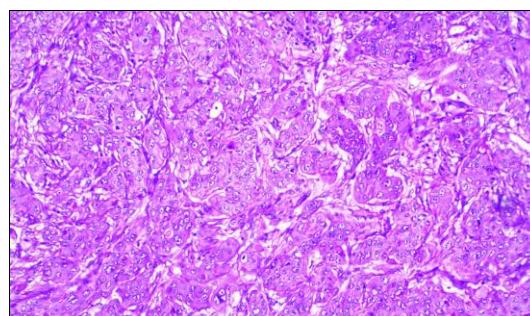


**Fig 3:** Photomicrograph showing nests of proliferating neoplastic squamous cells infiltrating the dermis (H&E x100).

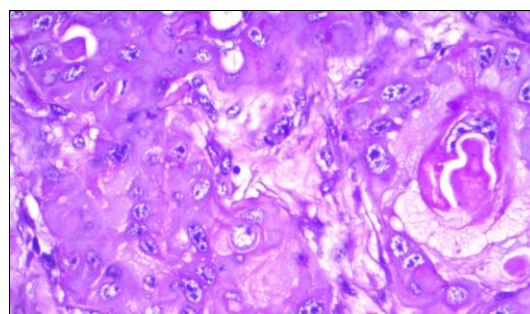


**Fig 4:** Sheet of neoplastic squamous cells showing marked nuclear atypia with multiple prominent nucleoli (H&E x400).

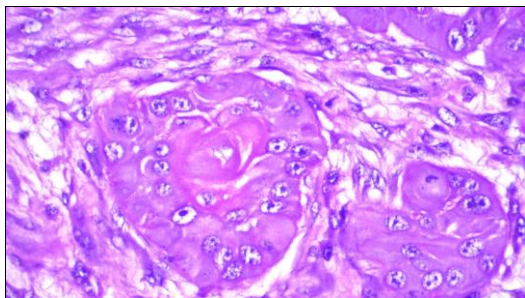


**Fig 5:** Cluster of neoplastic cells showing a well-formed keratin pearl with adjacent mitotic figures (H&E x400).

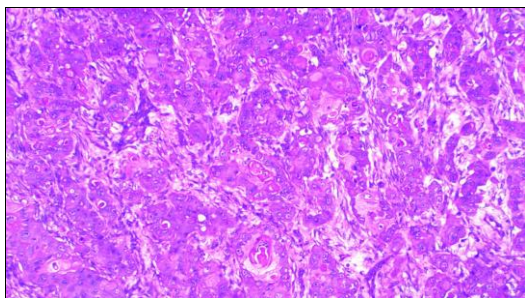


**Fig 6:** Neoplastic cells showing individual cell keratinization (dyskeratosis) (H&E x100).

### Diagnosis

Correlating the history of a slowly progressive, more than one-year-old crusted and ulcerated proliferative dermal growth in an aged, multiparous HF crossbred cow with the characteristic gross appearance and the histopathological demonstration of invasive squamous cell nests, individual cell keratinization and abundant keratin pearl formation with mitotic activity, a final diagnosis of well-differentiated cutaneous squamous cell carcinoma of the dorsal trunk was arrived at.

### Discussion

Cutaneous squamous cell carcinoma in cattle is most extensively described in its ocular and periocular form, where it is recognised as the leading cause of enucleation and a significant cause of premature culling in dairy herds, particularly in Holstein Friesian crossbred cattle above five years of age reared under conditions of prolonged solar exposure. Extraocular cutaneous SCC, although less frequently reported, follows a similar pathogenesis, arising preferentially on non-pigmented, thinly haired skin subjected to chronic ultraviolet exposure and repeated mechanical irritation. In the present case, the involvement of the dorsal thoraco-lumbar region, an area habitually exposed to direct solar radiation in animals maintained under open loose housing typical of the region, together with the light skin pigmentation characteristic of HF crossbred cattle, is consistent with the reported actinic pathogenesis of the tumour.

The chronic, slowly progressive nature of the growth over more than a year, its multicentric distribution and the crusted, ulcerated, cauliflower-like gross appearance observed here are typical of the plaque-to-carcinoma progression described for bovine cutaneous SCC, wherein an initial actinic keratotic plaque advances through papillomatous and keratomatous stages before becoming locally invasive. Histopathologically, the presence of numerous well-formed keratin pearls, extensive individual cell keratinization and organised tumour cell nests with only mild peritumoural inflammation is

characteristic of a well-differentiated (Grade I) tumour, which, unlike poorly differentiated or anaplastic variants, is generally associated with a lower risk of regional or distant metastasis and a comparatively more favourable prognosis following adequate local treatment. Differential diagnoses for chronic proliferative dermal masses in cattle include cutaneous fibropapilloma (bovine papillomavirus-associated), cutaneous lymphosarcoma, chronic myiasis-associated granulating dermatitis and actinic keratosis without frank malignant transformation; these were excluded on the basis of the characteristic histopathological features of invasive squamous differentiation observed in the present case.

Wide surgical excision with adequate margins remains the treatment of choice for localised, well-differentiated cutaneous SCC in cattle, and where feasible may be supplemented by cryosurgery, electrosurgery or local chemotherapeutic/immunomodulatory measures for residual or inaccessible lesions. Given the chronicity, multiplicity and extent of the lesions over the dorsum in the present case, the owner was counselled regarding the guarded long-term prognosis, the economic and welfare implications of the condition, and the importance of prompt surgical or veterinary intervention along with fly and wound management to prevent secondary myiasis and further local extension. The case reinforces the need for regular inspection of the skin in ageing, light-pigmented dairy crossbred cattle maintained under high solar exposure, and for early biopsy-based histopathological confirmation of any chronic, non-healing cutaneous growth, since clinical appearance alone can be mistaken for benign papillomatous or traumatic lesions.

### Conclusion

This report documents a clinicopathologically confirmed case of well-differentiated cutaneous squamous cell carcinoma over the dorsal trunk of a multiparous HF crossbred cow, a comparatively uncommon anatomical site for this tumour in cattle. The case underscores the diagnostic value of histopathology, characterised by keratin pearl formation, individual cell keratinization and invasive squamous cell nests, in confirming clinically suspected cutaneous neoplasms, and highlights the importance of periodic skin examination and timely biopsy in aged, light-skinned dairy crossbred cattle to enable earlier intervention and a more favourable outcome.

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### Conflict of Interest

Not available

### Financial Support

Not available

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