



## SEVERE CUTANEOUS BOVINE PAPILLOMATOSIS IN A CATTLE HERD

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### SUMMARY

A 5-month old zebu calf was noticed with wart-like growths on the head. These were removed surgically and tetracycline was administered. One Friesian bull in the herd was also noticed to have crusty lesions suspected to be dermatophilosis based on previous exposure, and was treated with lamstreptocide. A few months later, wart-like lesions were observed on the dorsum which later spread to other parts of the body and also spread to other animals in the herd. Papillomatosis and lumpy skin disease were suspected and samples were taken to histopathology and virology laboratories of NVRI where papillomatosis was confirmed based on clinical signs and histopathological findings. Cutaneous Bovine Papillomatosis (CBP) is a disease of economic importance, affecting breeding, hides and dairy industries. There is therefore a need for proper documentation of cases in order to determine the status of the disease in Nigeria.

**KEY WORDS:** Cattle, Skin, Papillomatosis, Histopathology.

### INTRODUCTION

Trade in livestock can be less attractive if unsightly and ugly warts appear on the body of animals which are common findings on many cattle. In most cases they constitute a minor nuisance, but occasionally warts can be a significant problem. Animals with papillomas are often disqualified from shows and exhibitions because of the ugliness coupled with the infectivity of bovine papillomatosis. Such animals should naturally not be slaughtered at abattoir in severe cases due to emaciation and the gory site of the lesion. The presence of these warts is of economic importance in the hide and skin industry.

Papillomas are usually a reaction of the skin to infection with papilloma viruses. Other areas often affected include the teats and scrotum. Warts vary in shape and size, from almost flat pea-sized lumps to large orange-sized balls on stalks. They are seen as solid

outgrowths of epidermis, sessile or pedunculated, with flat or cauliflower like surfaces. The four most common types of warts are squat, pedunculated, tags and flat (8). They appear as raised hairless lesions. It is common for large warts to bleed, especially during rubbing, which can, in some instances, lead to bacterial infection that may require further treatment.

Papilloma viruses are generally morphologically and topographically species specific, therefore immunity to one does not confer protection to others. Warts can affect all animal species including man, and it is also a Trans-boundary animal disease (TAD) (7).

In Cattle, warts occur all over the body and are often a herd problem because of the infectious nature of the disease. Transmission is by direct contact, infection-gaining entry through cutaneous abrasions caused by barbed



wire, dehorning shears and tattooing implements. Pecking birds have also been suspected of playing significant role in the contact spread of this infection.

Oncogenesis is induced by DNA – containing papilloma viruses. When virus genome becomes genetically integrated within a cellular proto – oncogene of the host, the cellular oncogene becomes activated by the promoter sequence of the viral genome, leading to the abnormal expression of the oncogene, hence neoplasia. Viral induced papillomas then begin with extensive proliferation of the basal cells of the epidermis (10). Papillomas are caused by papillomaviruses of the family Papovaviridae. Some of these cattle viral isolates have been demonstrated to have different antigen reactions and DNA composition. Six serotypes have been described; subgroup A consisting of Bovine Viral Papilloma 1 (BVP1), BVP2 and BVP5 which cause papillomatosis. Subgroups B consist of BVP3, BVP4 and BVP6 which are responsible for epithelial papilloma (9).

Four distinct types of bovine papillomaviruses were also defined by DNA sequence homology, antigenic properties and by the type of tumour they induce. These are BVP-1, BVP-2, BVP-3 and BVP-4 (5). The bovine papillomaviruses appear to be the most oncogenic of the papilloma viruses, and are able to infect a number of species other than its cattle host. Experimental intracranial injection of BPV produced meningiomas in calves (6), while subcutaneous injection of the virus induced fibromas in hamsters C3H/Eb mice strain (2).

Several techniques and devices have been extensively used in the management of papillomatosis, some of such include injection of proprietary preparations containing antimony and bismuth, cauterisation with trichloro acetic acid or 20% tincture of salicylic acid. Surgical excisions, removal by traction or ligation or by using a rubber ring. Newcastle disease virus (NDV) and drugs such as ivermectin and levamisole are said to possess antineoplastic and immunostimulatory properties (1) and have been successfully used in the management of bovine papilloma. Recent advances in the control of papilloma also involve the use of Newcastle disease vaccine that is said to have oncolytic activities. A very practical approach involves formalinised suspension of bovine warts with inactivated virus. This provides an autogenous vaccine for effective treatment and prophylaxis of bovine papillomatosis (12).

Autogenous vaccine made from sterile homogenized tumour tissue prepared according to the standard protocol with or without immunomodulators has resulted in tumour regression from about 3 weeks post initiation of treatment, and within 6 weeks all warts may spontaneously disappear and animals recover completely (4).

Papillomatosis, though a trans-boundary disease, is poorly reported in Nigeria. Its prevalence is however not in doubt, as it is a common sight in both commercial farms and free-range animals. We therefore report the outbreak of Bovine papillomatosis in a cattle herd in Vom, Plateau State Nigeria and elucidate on its diagnosis and preliminary management.



## CASE REPORT

In July, 2006, a 5 months old Zebu heifer was noticed with 3 wart-like growths around the face. There was also an abscess close to the warts. The abscess was lanced and the heifer was treated with Oxytetracycline L.A 20 mg/kg IM. The wart - like lesion later spread around the face and ears.

Nine months after, 3 more zebu heifers in the same herd were noticed, having similar lesions around the head and neck. One of the newly introduced heifer also developed similar lesions. All the affected animals were isolated and quarantined. Skin scrapings were taken to the Viral Research Dept, and it was negative for Lumpy skin disease (LSD). Clinically however, papillomatosis was suspected and tissue biopsy was taken for histology.

On 12<sup>th</sup> July, 2006 a Friesian bull with heavy tick infestation and crusty lesions on the skin suspected to be dermatophilosis was brought to the herd from a private farm. The bull was quarantined for 3 months and topically treated with Lamstreptocide, Oxytetracycline L.A 20mg/kg and

sprayed with acaricide (Amytrax). There was remission of lesions after 3 months and the bull was released into the herd.

On the 7<sup>th</sup> of August 2007, lesions were noticed again on the skin. These lesions were raised, hairless and were seen on the head, neck, legs and scrotum (fig.1a). The bull was isolated and treated again with Lamstreptocide and Oxytetracycline. L.A 20mg/kg I.M and skin scrapings were submitted to Dermatophilosis lab and Viral Research Department. In all cases, appetite, temperature (36.5-38.5<sup>0</sup>C) and pulse rate (60-90 beats per minute) were within normal ranges. Clinically there were raised hairless lesions (warts) varying in size from pea to tennis ball. Lesions were seen on the head, neck and shoulders in the zebu cattle (fig.1b) and the head, neck, shoulders, legs, dorsum, lower abdomen and scrotum in the Friesian bull. In addition to the lesions seen in the Zebu, the skin was rough, wrinkled and thickened. There was also lameness and loss of weight.

## GROSS PATHOLOGY

Gross pathological lesions vary in different animals. The Zebu bull presented with discrete, multiple to diffuse, solitary and coalescing lesions. Irregularly raised, pendunculated cauliflower-like growths (warts) were

obvious. These lesions were distributed on the head, neck and face, ears, mandibular regions, hump, shoulders, dorsum and the lateral abdomen. Some were found on the posterior hind limbs and perineum.

## HISTOPATHOLOGY

Histopathologically, the Zebu had orthokeratotic hyperkeratosis with increased granular cell and keratohyaline granules, hyperplastic non cornified epidermis with formation of rete ridges (fig.1c and 1d) and

downward 'pegs' projecting into the dermis. In addition, acanthotic spinous cells, fibrosis and mononuclear cellular infiltration- (fibropapilloma) were observed.



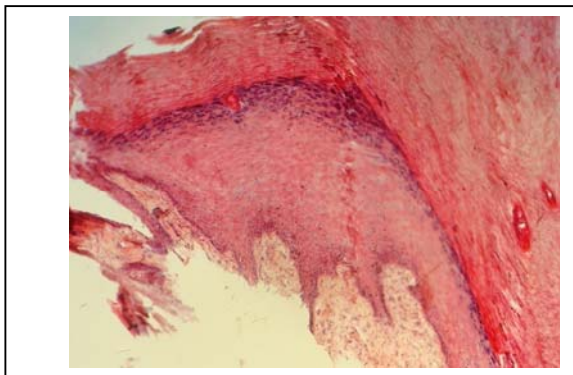
Figures 1a-d. Clinical and histological presentations of the papilloma lesions



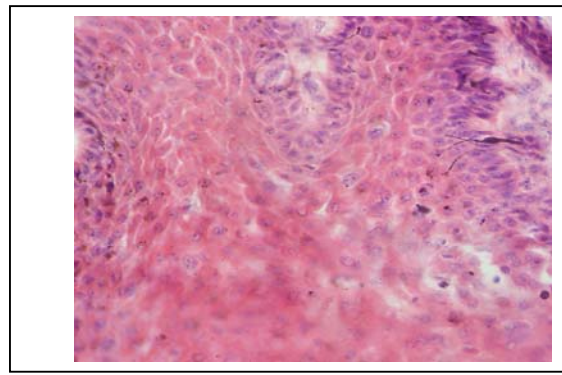
1a. Friesian bull with papilloma lesions



1b. Zebu yearling with severe papilloma lesions



1c. Hyperplasia of stratum spinosum and Rete ridge



1d. Intercellular Spongiosis

## RESULT AND DISCUSSION

### **Parasitology:**

Result of skin scrapings were negative for mites and lice, however, faecal samples revealed *Strongyle* eggs (100 oocyst/g).

### **Bacteriology/Mycology:**

Skin scraping was negative for *Dermatophilus congolense* but positive for *Fusarium graminearum*.

### **Virology:**

The skin biopsy was negative for lumpy skin disease virus by virus isolation technique.

Cutaneous bovine papillomatosis, though easily identifiable from skin outgrowths, have scarcely been reported in Nigeria. Various occurrences of skin eruptions as outgrowths have been seen in cattle herds in Nigeria but are often not diagnosed beyond clinical presentation. In this report however, the diagnosis of bovine papillomatosis was based on the presented clinical signs, histopathology and the exclusion of other differential diagnoses.



Both multiple and solitary papillomas were seen in the yearlings and the older bull. According to Smith *et al.*; (11) the disease is self limiting but in this particular case, the lesions progressed over a period of 18 months without regression and spread to other animals in the herd. Regression of warts has been reported to occur within a year (11). This may suggest a highly virulent BPV in the herd. This is in agreement with the report of Yukiko *et al.* (13). Malignancy of Papillomas has been reported in the presence of

genetic and environmental factors involving BVP4 and BVP 6.

Cutaneous bovine papillomatosis is mainly transmitted by direct contact, although indirect means have also been incriminated. The birds that peck on this farm and the animal handlers are suspected to have played a role in transmission in this outbreak. Hereditary disposition may have also played an important role as three of the heifers affected are from the same dam. This observation is strengthened by a similar report by Borku *et al.* (3).

## CONCLUSION

Cutaneous bovine papillomatosis is a disease of economic importance affecting hide quality, breeding and milk production when the skin, limbs, genitalia and the mammary gland are involved. Management with autogenous vaccine is being pursued since cutaneous bovine papillomatosis was identified as a progressive herd infection. Further investigation should be considered in treatment trials with

ivermectin, levamisole and Newcastle disease vaccine. Though BVP isolation in tissue culture has not been successful, collaboration for molecular identification and sequencing of the BVP is suggested. Documentation of this case as well as many known unreported cases call for further works to determine the status of this disease in Nigeria.

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