

## Research Article

### Lymphocytopenia in a Calf with Infectious Bovine Keratoconjunctivitis: A Case Report

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**Abstract:** Infectious Bovine Keratoconjunctivitis, also referred to as Pink Eye, is a highly contagious disease that causes inflammation and ulceration of the cornea and conjunctiva of the eye. This report describes a case of lymphocytopenia in a 1 year old heifer. A Red Bororo heifer was presented to the University of Abuja Veterinary Teaching Hospital. She had a history of bumping into an object. Clinical signs included epiphora, conjunctivitis, with varying degrees of keratitis and lacrimation. Rectal temperature was 38.4<sup>o</sup>c and respiratory rate was 28 (cycles/minute). Pulse rate was 48 beats/minute. Blood samples and ocular swab were sent to the laboratory. The ocular swab culture and subsequent identification implicated gram negative, oxidase positive rods and gram positive, coagulase positive cocci as causative agents of the infection. The direct blood smear, wet mount and buffy coat technique revealed that the calf was negative for babesiosis and trypanosomosis. Microbiological examination revealed the presence of only *Moraxella bovis* in the heifer presented while *Staphylococcus aureus* was isolated from the other four in-contact cattle. The blood picture also indicated moderately low lymphocytopenia. The animal was treated with 2 doses of long acting oxytetracycline, 4 days apart, and the blood and microbiological tests were repeated post-treatment. Thereafter, the lymphocyte value returned to values within the normal range. It is important to assay the lymphocyte count in cases of bovine pink eye, so as to prevent dangers that may arise with very low levels of lymphocyte count.

**Keywords:** Calf, lymphocytopenia, *moraxella bovis*, pink eye, *staphylococcus aureus*

## INTRODUCTION

The pathogen most commonly isolated from Pink eye is *Moraxella bovis* (gram negative bacillus). Other organisms such as *Staphylococcus* and *Cornybacterium* have also been isolated from cases of pink eye (Faez *et al.*, 2013). It is a painful debilitating condition that can severely affect an animal's productivity. The disease spreads rapidly and causes economic losses because there is decreased weight gain. Young stocks are most susceptible but the disease may be found in cattle of all ages. Many older animals may have a natural immunity to pink eye because of previous exposure, which explains the importance of vaccination in preventing the disease (Whittier *et al.*, 2009).

The first report of Infectious Bovine Keratoconjunctivitis was Billings (1889). Pink eye occurred in the sub humid zones of Nigeria in four herds in 1982 and five herds in 1983, in which 25% of both adult and young animals in these herds were infected (FAO, 2001). The effect of Pink eye in males and female calves are long standing. Compared with healthy calves, infected calves have a weight decrease of 17-18 kg at around 205 days of age (Kahn and Scott, 2010). The economic loss is not particular to Nigeria

and Africa alone. In an Australian post survey, 81.3% reported the case, and 75% reported the weight loss (Troutt and Schurig, 1985). The infection increases during the spring and summer, and peaks with high values of Ultraviolet radiation (Slatter and Edwards, 1982). Clinical signs include epiphora, conjunctivitis, with or without varying degrees of keratitis and lacrimation. Appetite may be decreased because of ocular discomfort and visual disturbance. Corneal rupture and permanent blindness can occur in some cases. There has been no reported case of lymphocytopenia in cases of pink eye.

## CASE REPORT

**Anamnesis:** A female Red Bororo calf was presented to the University of Abuja Veterinary Teaching Hospital, Abuja, Nigeria (Fig. 1). There was a history of bumping into object, lacrimation and anorexia, which began few days before the case was presented. The client said he noticed the same signs in 4 other calves in the herd, but presented only this calf because she was the one badly affected.

**Treatment plan:** The farm was visited, so that the other infected animals could be examined and treated.

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Fig. 1: A Red Bororo heifer manifesting epiphora

**Clinical findings:** Physical examination revealed that the calf was slightly emaciated. There were bilateral serous ocular discharges, corneal opacity and conjunctivitis. Rectal temperature was 38.4°C and respiratory rate was 28 (cycles /min). Pulse rate was 48 beats/min. The ages of the heifer and other cattle on the farm were determined using rostral dentition technique as previously described by Lasisi *et al.* (2002).

**Tentative diagnosis:** Infectious Bovine Keratoconjunctivitis was tentatively diagnosed. The primary differential is Infectious Bovine Rhinotracheitis, which causes conjunctivitis and edema of the cornea in cattle.

**Hematology:** 10mL of blood was taken from the jugular vein. This was divided into plain and Ethylene diamine tetra Acetic acid (EDTA)-coated bottles for complete blood count and other hemoparasite detection. No blood parasites were found.

**Fecal sample analyses:** Both urine and fecal samples were collected for examination. Detection of helminth eggs is through the use of floatation and modified Mac master techniques, while urinalysis was done for urine's pH and specific gravity.

**Bacterial culture:** Sodium Cloxacillin was added to sterile blood agar. This gave us a final concentration of 2.5 µg of Cloxacillin per ml of blood agar. Conjunctiva swab was used in streaking the agar, and it was incubated at 35°C for 24 h. After this, examination of the smear was done

**Other identification tests:** Tests on motility, presence of catalase, oxidase, coagulase and hemolysis on blood

agar, as described by Barrow and Feltham (1993) were performed.

The result of the hematology is shown in Table 1.

**Bacterial isolates:** *Moraxella bovis* was isolated from the 5 calves

*Staphylococcus aureus* was isolated from 4 calves.

**Bacterial characteristics:**

**Moraxella bovis:** Gram-negative plump non-motile rods, Catalase positive, Oxidase positive, a- hemolytic organism with shiny colonies on blood agar.

**Staphylococcus aureus:** Gram-positive non-motile cocci, Catalase positive, Oxidase negative, Coagulase positive, a-hemolytic yellow colonies on blood agar

**Urinalysis result:**

Specific gravity = 1.030  
PH = 8

**Microbiology examination:** Ocular swab of the heifer was sent to the laboratory and *Moraxella bovis* was isolated.

**Confirmatory diagnosis:** Based on the clinical signs and microbiology result, a confirmatory diagnosis of pink eye was made and treatment was initiated.

**Therapy:** The eye was lavaged with normal saline and the bulbar conjunctiva was injected with penicillin. Oxytetracycline (NI-OXY20% L.A, HEBEI KEXING PHARMACEUTICAL CO CHINA) was administered twice, at 4 days interval. Blood and ocular swab samples were obtained at 10 and 30 days post-treatment. At 10 days, the aetiologic agent was absent and at 30 days lymphocyte levels returned to values that were within the normal range.

**Follow up:** After treatment, the animal was discharged and the farm was visited to conduct clinical examination for other in-contact animals (Table 2) that were showing some signs similar to the one just discharged and other apparently healthy ones. All of

Table 1: Result of the blood analysis of the infected calf relative to reference values

Test	Result	Reference	Remark
PCV (%)	26.00	26-46	Normal
Hb (g/dl)	12.23	8-15	Normal
RBC (x10 <sup>6</sup> /µL)	7.000	5-10	Normal
WBC (x10 <sup>3</sup> /µL)	4.500	4-12	Normal
NEUTROPHILS (x10 <sup>3</sup> /µL)	2.430	0.6-4.0	Normal
EOSINOPHILS (x10 <sup>3</sup> /µL)	0.126	0.0-2.4	Normal
LYMPHOCYTE (x10 <sup>3</sup> /µL)	1.680	2.5-7.5	Low
MONOCYTE (x10 <sup>3</sup> /µL)	0.080	0.025-0.85	Normal Kahn and Scott (2010)

Table 2: Abnormal changes in the blood analysis of other infected calves

	Test	Result	Reference	Remark
CALF 2	LYMPHOCYTE (x10 <sup>3</sup> /µL)	1.50	2.5-7.5	Low
CALF 3	LYMPHOCYTE (x10 <sup>3</sup> /µL)	1.65	2.5-7.5	Low
CALF 4	LYMPHOCYTE (x10 <sup>3</sup> /µL)	1.30	2.5-7.5	Low Kahn and Scott (2010)

them were injected with the same drug (20% Oxytetracycline) for the same duration as a form of prophylaxis. After 10 days, there was no appearance of the infection in that particular holding.

### DISCUSSION

This present case report was focusing on the infection of a heifer and some in-contact cattle. This is similar to the work of Lasisi *et al.* (2010) in which a group of calves suffered from anaemia and mortality as a result of sucking activities of short-nosed louse *Haematopinus eurysternus*. Pink eye was found to be among some of the transboundary diseases of animals in Plateau State of Nigeria (Ndahi *et al.*, 2012). By implication therefore, calves are highly susceptible to various infectious agents particularly in Nigeria.

Lymphocytopenia is the condition of having an abnormally low level of lymphocytes in the blood. The lymphocytes are white blood cells with important functions in the immune system of mammals. The changes leucocyte counts in the acute stage of disease are important in disease progression. This phenomenon of lymphocytopenia has been reported in pure bred cattle naturally infected with *Theileria annulata* in Saudi Arabia (Omer *et al.*, 2002) also, in both cattle and buffaloes experimentally infected with Foot-and-mouth disease virus in India (Mohan *et al.*, 2008) The phenomenon has been described in natural bovine trypanosomiasis in Brazil and Bolivia (Silva *et al.*, 1999), which has also been linked to the activity of neuraminidase produced *in vivo* by pathogenic trypanosomes (Antoine-Moussiaux *et al.*, 2009). It is also a major cause of luteal dysfunction among cattle breeds (Rathbone *et al.*, 2001).

Lymphocytopenia is a rare complication of infectious bovine keratoconjunctivitis in calves. Among the few reported cases, there is no report describing the blood picture of calves infected with infectious bovine conjunctivitis (pink eye). However, the observation of lymphocytopenia in the Red Bororo calf and her in-contact herd mates with infectious bovine conjunctivitis is very similar to same observation by Useh *et al.* (2008) in which there was lymphocytopenia among Zebu cattle following a natural outbreak of blackleg infection at Kachia, Kaduna state, Nigeria. The relationship between *Moraxella bovis* and lymphocytopenia has not been established. It is therefore important that cases of pink eye should not be taken with levity because other secondary bacterial agents might set in because of the decreased lymphocyte count, which will cause a weak defense system. However, pink eye infection in cattle, has been found to be preventable using vaccines (Smith *et al.*, 1990). Further work should be done to identify the type of lymphocytes affected. We advocate that further scientific studies be carried out to identify the type of

lymphocytes affected particularly during infectious bovine conjunctivitis natural outbreaks in our cattle herds in Nigeria.

### CONCLUSION

Irrespective of the means of managing the condition, in all cases of infectious bovine keratoconjunctivitis, it is important to protect the affected animal(s) against secondary infections by giving a broad spectrum antibiotic because of other opportunistic infectious agents that may be present when lymphocytopenia persists for longer period.

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