

# Foot-and-Mouth Disease Outbreak at Bageshwori Gaushala, Chitwan, Nepal

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**Abstract:** Cow being the national animal of Nepal has special place in the society. Religious institutions have since prehistoric time reared and cared for cattle herds and the tradition still continues. The Bageshwori Gaushala (cow shelter), initiated by the Hindu Rastraguru Yogi Narhaharinath in mid-1990s is one of the largest of such nucleus indigenous cattle herds in Nepal. Indigenous cattle conservation strategy of Nepal has recognized the importance of this nucleus herd, kept by grazing in the surrounding forest. Ethnoveterinary approaches of managing the herd health is in practice and vaccination was never done. Occasional outbreak did happen in past but overall the herd never suffered severe impact. In April 2018, an outbreak of foot-and-mouth disease (FMD) occurred at Bageshwori, Gaushala, Devghat, Bharatpur Metropolitan-1, Chitwan district of Nepal. In the bovine herd studied, 80 (53.33%) out of 150 affected animals presented characteristics FMD symptoms as vesicular lesions, drooling salivation, foot lameness, high fever and weakness. Following prompt supportive treatment, the condition improved. The complete recovery of infected herd was observed after 45 d. Laboratory analysis showed the presence of *Aphthovirus* serotype O in the clinical sample. The present study attempts to provide fresh insights into the recent FMD outbreak, clinical signs, their effective treatment protocol and preventive measures that must be practiced following FMD outbreak.

Key words: Aphthovirus, foot-and-mouth disease, outbreak, serotype O.

# **1. Introduction**

Foot-and-mouth disease (FMD), also called as Aptho fever, is highly contagious, acute, viral disease of cloven-hoofed animals. It is economically important viral disease in farm animals like cattle, buffalo, goat, sheep and pigs [1]. Wild ruminants like deer and antelope are also susceptible to this disease [2]. It has high morbidity but low mortality. Mortality is mostly seen in young animals. FMD is characterized by blister formation and erosion in and around mouth, on the teats and between hooves [3, 4]. Other symptoms are high fever, excessive foamy and stringy salivation and lameness. In chronic cases, it is characterized by anorexia, low conception rates, abortions, still birth and sore feet [5]. Both vertical and horizontal ways of transmission have been recorded. The direct contact with an infected animal is the commonest infection route, but the virus may spread by mechanical contamination of animal works stuffs such as worker clothes, fodder and feeding utensils. The incubation period of the disease varies from 3 d to 8 d but in some cases more than two weeks of window period have also been observed.

The etiological agent, FMD virus (FMDV; *Aphthovirus*, Picornaviridae), is non-enveloped, single stranded positive sense RNA virus. Seven different serotypes of FMDV identified are A, O, SAT1, SAT2, SAT3, Asia 1 and C. The vaccination against one serotype does not provide cross protection against other [6]. This makes the vaccination programme against FMD much challenging.

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FMD is prevalent during all seasons and across all parts of Nepal with large majority of outbreaks caused by FMDV serotype O [7]. The distribution of FMDV serotypes responsible being O (82%), Asia 1 (15%) and A (3%). From April 2016 to July 2016, the FMD survey in the cattle herds in 23 different districts of Nepal by Veterinary Epidemiology Centre (VEC) figured out 61 (53%) out of 115 collected samples were classified in O serotype [8, 9]. In a country or region, the occurrence of the FMD endemic has long-term effects reducing animal productivity moreover, the restrictions on international trades. Although the FMD elicits a low mortality rate, considering 20% and 10% reduction rate in milk and meat productions respectively estimated economic loss for Nepal is about 66 million US dollars per year [10].

Bageshwori Gaushala (Yogi Narharinath Gau Sangarkchan Kendra) located at Bharatpur Metropolitan-1, Chitwan, Nepal has been centre of cow shelter since mid-1990s [11]. Outbreak was detected here in predominantly indigenous herd and the treatment followed as explained in this paper.

# 2. Materials and Methods

#### 2.1 History

In a herd of cattle (*Bos indicus*) at Bageshwori Gaushala, Devghat area of Chitwan district, Nepal consisting of 25 milking cattle, 10 bulls, 62 heifers, 32 calves and 21 elderly cattle with no history of FMD vaccination, the FMD outbreak was reported during the month of April, 2018. They were in free-ranged grazing system, grazing in the nearby jungle, where they often interact with wild animals. The farm management was poor and most cows were emaciated. History of frequent parasitic infestation was also recorded.

Anorexia, excessive salivation and foot myiasis was reported at the beginning of disease progression followed by lameness. Severity of disease was more in calves. Abortion of one pregnant cow at last trimester was also reported.

#### 2.2 Findings of Clinical Investigation

The affected animal were depressed, off feed, reluctant to move, exhibited high fever (39.5-41 °C) and excessive foamy salivation (Fig. 1). Erosion of epithelial tissue of oral mucosa (Fig. 2) led to difficulty in feeding. Most infected animal showed lameness due to vesicles formation and wound development between the hooves (Fig. 3) with concurrent infestation by arthropod maggot. Total 80 (53.33%) out of 150 heads were infected and clinical examination suggested the occurrence of FMD. However, for laboratory confirmatory diagnosis and to ascertain the FMDV-serotype, the samples (epithelial tissue of oral mucosa and serum) were dispatched to National FMD and Transboundary Animal Diseases (TADs) Laboratory, Kathmandu (National Laboratory).



Fig. 1 Excessive foamy salivation in a mother cow.



Fig. 2 Erosion of epithelial tissue of oral mucosa.



Fig. 3 Hoof of adult cattle showing myiasis after the rupture of vesicles.



Fig. 4 Regeneration of epithelial tissue after treatment on the ninth day.

#### 2.3 Progression of Disease

Initially few adult cows presented noticeable clinical signs and symptoms like off feed, drooling salivation and refuse to move thus were kept under surveillance. On the second day in addition haemorrhagic oral mucosa was noticed. Close inspection of foot on the third day revealed foot myiasis and animal showed partial lameness. Blister on mouth of such animal appeared and abortion of pregnant animal at its third trimester was also reported. Day by day intra-herd transmission was noticed and at the third day almost 20 animals presented characteristic signs and symptoms. Treatment was started from day four. Till the ninth day new cases were recorded from the farm. Deaths of eight infected calves were also recorded.

### 2.4 Findings of Laboratory Examination

Epithelial tissue of oral mucosa and blood from eight cattle including one lactating adult, four heifer and three calves were analyzed. The serological analysis revealed 100% samples were positive for antibody against the FMDV. One sample was identified as FMDV serotype O by polymerase chain reaction (PCR).

## 3. Treatment and Discussion

After the confirmatory diagnosis, the farm was placed under quarantine and necessary measures were taken to prevent FMDV spread. Segregation of infected cattle from healthy ones was also done. The infected cattle milk was discarded even for its calf. The whole farm was disinfected using strong phenyl solution and citric acid at dose rate of 30 g/L of water. Tracing the outbreak both forward and backward was attempted. As the herd was kept free from any vaccination routines, that year six months prior haemorragic septicaemia and black quarter combined vaccine was administered as government agency could not risk unvaccinated herd close to commercial farms. The highway that transports live animals from the plains and India inland for commercial dairy also runs through their grazing land. Pattern of outbreaks in such transported herds and commercial farms around the district was kept in monitoring. The fear of emerging new lines of serotypes and real concern to understand the prevalent serotypes in Nepal [4] made reporting this outbreak even more important.

Treatment was initiated after 3 d of initial appearance of signs and symptoms. The severely affected cattle were administered 4-6 L of intravenous fluid (normal saline, dextrose normal saline, Ringers lactate) along with 5-10 mL of vitamin B-complex for 5 d depending upon bodyweight and level of dehydration. The cattle showing pyrexia were administered meloxicam-paracetamol combination 0.5 mg/kg body weight intramuscularly. The wounds on oral cavity were cleaned using 1% iodine solution and oral mucosa was painted with boro-glycerine. Aloe vera gel was also applied on the mucosal wounds of mouth after cleaning. Aloe vera gel helps to decrease the severity of inflammation, speeds wound contraction and epithelialization and decreased scar tissue size [12].

Hooves were cleaned using KMnO<sub>4</sub> solution first and then 1% iodine solution. Maggots were removed manually after application of turpentine oil plug from the interdigital space of hooves.

Myiasis infection was treated using Negasunt® Dusting Powder Pfizer Limited as a maggotticide. Herbal based, Himax ointment (Terminalia arjuna Family—Combretaceae) extract. was applied topically on the hoof as a wound healing agent and fly repellent. T. arjuna has been widely used as medicinal plant because of its antibacterial and antiviral properties [13]. This plant also increases the wound contracting ability, epithelization period, tensile strength and regeneration of tissues at the wound area [14]. Orally Restobal® (M/s Ayurvet Limited) was administered for 5 d (50 mL b.i.d per animal). This herbal product act as a potent immunomodulator and anti-stressor [15, 16]. The

affected herd responded well to supportive therapy. Re-epithelialization of ruptured oral mucosa and tongue surface was observed on the ninth day (Fig. 4). The workers of the farm were advised to keep the animals and shed clean and dry.

Such outbreaks can be prevented by administering quadrivalent vaccine (serotype O, A, C, Asia 1), introduced in 2010 in Nepal. The cattle can be administered with the first dose of vaccine against FMDV at the age of four months and above. The booster dose is administered one month after the first dose and subsequent doses once every six months. Control of FMD by ring vaccination may be carried out in a country with a completely susceptible livestock population. It involves the vaccination of all susceptible animals in a prescribed area around an outbreak and depends for its success on the rapidity by which diagnosis, typing the virus and vaccination are carried out.

### 4. Conclusions

In case of FMD outbreak, mortality is normally low in adult animals. However, morbidity is high, and the disease results in considerable economic losses due to reduced milk production and growth rates, as well as forced trade restrictions [17-20]. Thus FMD is economically important disease of cloven-footed animal. Since there is no specific treatment for viral disease like FMD, therefore symptomatic treatment and good hygiene is always recommended. Control of fever and dehydration and immunopotentiation is always necessary to speeds up the recovery. Serotype O was the most commonly detected in Nepal although serotypes A and Asia 1 have been also repeatedly detected, and these serotypes continue to circulate in neighboring India and Bangladesh [21-23]. Thus, vaccination of susceptible animals against FMD is а well-established strategy to prevent and combat the disease. Inadequate quarantine facilities, unknown status of disease in transported animals from within

the country and from India also poses threats of disease outbreak. Thus, tracing the outbreak, it was found that recently important herd in another city of Pokhara showed similar characteristics of FMD outbreak. Likewise, the management of herds raised in intensive and semi intensive structure like this herd needs better management and vaccination strategy to manage diseases like FMD that have huge economic and welfare consequences.

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