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Field Observations of Suspected Clinical Cases of Contagious Ecthyma in Goats

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Abstract

Goat rearing is one of the best opted sources of earning livelihood for the rural poor and majority of the farming communities consider goat rearing as a family business. Contagious ecthyma (CE), an infectious disease primarily of small ruminants is caused by an epitheliotropic DNA virus namely, Orf virus, a member of the genus *Parapoxvirus* of family *Poxviridae*. The virus causes significant financial losses in small ruminant production. The disease is clearly differentiated from the scabby and ulcerative lesions on scantily haired or non-hairy areas of muzzle, ears, lips and nostril. Although the ailment is usually benign and self-limiting, it may inflict significant financial losses affecting the productivity of livestock. In the present paper, we intend to aware the farming community and readers through reporting what we came across during our field visits at farmers' door steps in villages around our institute ICAR-DFMD-ICFMD, Odisha under corporate social responsibility and others in the period between July and August 2022.

Keywords: Contagious ecthyma, Goat, Odisha, Orf

Introduction

In India, more than 85% farmers are small and marginal land-holders depending primarily on livestock for income generation and earning livelihood. Goat has been the acceptable livestock by the marginal and landless farmers of the society due to the low investment, easy management, short gestation and high return from the species. As per 20th Livestock Census conducted during 2019, the total goat population was 148.88 million heads contributing 27.7% of the total livestock of the country. In Odisha state, the total goat population in 2019 was 6.4 million. ICAR-Central Institute in Research on Goats (ICAR-CIRG) in 2013 has estimated an increase in goat population to 216 million by 2050 in India.

India has more than 23 registered goat breeds well adapted to different agro-climatic conditions, while 26.97% are of pure breed, 11.77% of graded and 61.26% are non-descript. Most of the poor farmers allow their goats for grazing outside as it is the only option left for them. Apart from proper feed, protection from various diseases particularly infectious ones is a major stumbling block for the productive goat husbandry. In this list, PPR/ goat plague occupies the top followed by bluetongue, goat pox, contagious ecthyma, enterotoxaemia, CCPP, *etc*. External and internal parasites especially round worms also hamper the growth and productivity of the goats.

Contagious ecthyma (CE) is an extremely contagious, zoonotic, viral skin ailment affecting goat, sheep and wild small ruminants. The disease was first recognised in Great Britain in 1928, while in 1932 it was first reported in India. The disease is also well known by several synonyms *e.g.*, Orf, Ecthyma contagiosum, Contagious pustular dermatitis (CPD), Contagious pustular stomatitis (CPS), Infectious labial dermatitis (ILD), Sore mouth, Scabby mouth, *etc*.

Host Range and Causative Agent

CE primarily occurs in small ruminants and is very often relatively more severe in goats. Kids and lambs are more prone than the adults. It sometimes affects camels and known as camel contagious ecthyma (CCE) involving mainly immature young camels with a morbidity rate of about 60-100% and the mortality rate of 5-20%. The infected animal remains immune for approximately 2-3 years, after which reinfection may be possible, although the disease will be of

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less severe in nature. This disease is also reported in some wild ungulates. Very rare cases have also been reported in dogs and cats.

CE is caused by Orf virus (ORFV), a double-stranded DNA virus belonging to the genus *Parapoxvirus* in the sub-family *Chordopoxvirinae* and family *Poxviridae* (Caravaglio and Khachemoune, 2017). Owing to certain limitations in the diagnostic tests applied, sometimes a virus may initially be identified as ORFV, but later gets reassigned to another species of *Parapoxvirus*. To cite an example, an ailment initially described as CE in camels has presently been designated as pseudocowpox virus. ORFV is inactivated at 59 °C for 30 minutes. Sodium hypochlorite and quaternary ammonium-based disinfectants were proven effective disinfectants, while ethanol was ineffective. Detergents, alkalis, Virkon® and glutaraldehyde were also effective.

Epizootiology

All ages of goats and sheep are susceptible. The disease is transmitted through direct contact with infected animal with its scab lesions or indirectly from contaminated environment (fomites *e.g.*, contaminated tools, cloth) and animal care-takers. The virus enters the body through the breach in the skin or abrasions inside the mouth. Nursing kids may act as spreaders of virus to the udders of the susceptible lactating does. After healing, the virus reportedly stays viable on the skin nearly for one month. Not only the scabs falling to the ground, but also the carrier animals, can spread the disease through shedding the virus. Being hardy, the virus has the ability to survive for long in cold and dry environments, but gets destroyed by extremes of temperatures.

Incubation Period

The incubation period of the disease is short. Two to three days after the exposure, the disease occurs in sheep and goats, while reindeer have been infected in about 5 days in experimental setup.

Pathogenesis and Clinical Features

After gaining entry through the breach on skin surface, ORFV replicates in the epidermal cells leading to gradual formation of striking skin lesions through several phases *i.e.*, erythema, macule, papule, vesicle, pustule, scab with a final scar (Gelberg *et al.*, 2012).

The clinical signs vary in degree of severity from hyperemia/congestion and small pustular appearance around the mouth area to highly proliferative and exudative lesions forming scabs with involvement of mucosa and skin. After 4-8 days of exposure to the virus, blisters appear on the mouth and muzzle that become crusty scabs. Clinically the disease is characterized by lesions at the mouth commissures and nostrils, but it may also occur within the mouth of especially young lambs. With due course of time, the cutaneous lesions become thick forming brown scabs over areas of inflammation and ulceration. Very often the scabs are friable that bleed easily upon removal. Bud-like papillomatous growths are also observed. Lesions on the udder of the ewe and doe keep the kids away without allowing it to suckle. Skin lesions around the mouth region produce pain and lead to anorexia or starvation (Constable *et al.*, 2017). Lesions in feet result in lameness and complications with secondary infection *e.g.*, *Dermatophilus congolensis* and maggot or screwworm infestations may aggravate the lesions. One unusual case was reported where Boer and Boer cross goats developed severe proliferative dermatitis followed by chronic pneumonia, arthritis and lymphadenopathy. In 2008, three unusual reports of CE were recorded in cats those were having exposure to infected small ruminants. In the 1970s, the disease was suspected in dogs fed with unskinned carcasses from sheep developing dermatitis with ulcers and subsequent scabs around the head.

During our field visits many goats with different types of lesions were encountered. The papules and crusts with erosions sometimes disfigure the upper lip with nasal exudates blocking the nostrils of the affected goat (Figure 1). One young goat having proliferative lesions around the mouth region was observed in a village (Figure 2). Wet and ulcerative scabby lesions around mouth, lips and muzzle

Figure 1: Papules and crusts interspersed with erosions disfiguring the upper lip with nasal exudates blocking the nostrils

Figure 2: Proliferative lesions around mouth region of a young goat

Figure 3: Wet and ulcerative scabby lesions around mouth, lips and muzzle with epithelial erosions of a goat

Figure 4: Dry and scabby lesions around mouth, lips, muzzle observed in a goat flock

Figure 5: Raised, papillomatous, crusted lesions around mouth, chin and muzzle of a goat

with epithelial erosions were observed (Figure 3). Dry and scabby lesions around mouth, lips and muzzle were appreciated in several goats in a flock (Figure 4). Raised, papillomatous, crusted lesions around mouth, chin and muzzle were obvious in a local goat (Figure 5). In one affected goat, severe proliferative ulcerative scabby lesions were found around mouth, lips, chin and muzzle exposing the wet eroded epithelial layer (Figure 6). Well differentiated crusty scabs were visible on left commissure of mouth, chin and upper lip of a goat (Figure 7). Scabby lesions around both lips and commissures with a central wet erosive line in upper lip exposing the underlying dermis were apparent in an affected goat (Figure 8).

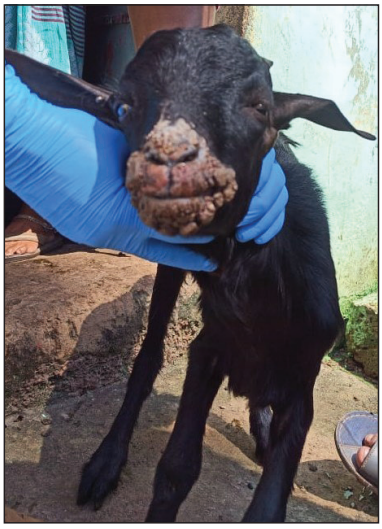

Figure 6: Severe proliferative ulcerative scabby lesions around mouth, lips, chin and muzzle exposing the wet eroded epithelial layer

Figure 7: Well differentiated crusty scabs visible on left commissure of mouth, chin and upper lip of goat

Figure 8: Scabby lesions around both lips and commissures with a central wet erosive line in upper lip exposing the underlying dermis in a goat

Pathological Changes

The typical lesions of papule, pustule and scabs are observed around mouth, nostrils and eyelids. Scratching and rubbing of affected parts against hard object out of intense pruritus, results in hemorrhages and severe skin abrasions. The virus infection often causes swelling of associated superficial lymph nodes of the region. Oral mucosa also becomes hemorrhagic with ulceration.

Typical histological alterations like hyperkeratosis, parakeratosis and acanthosis; ballooning degeneration of keratinocytes and cellular degenerations in stratum spinosum layer and infiltration of mononuclear cells have been reported (Constable *et al.*, 2017). Presence of intracytoplasmic eosinophillic inclusions, though not a consistent feature, may also be found in the infected cells (Guo *et al.*, 2004).

Diagnosis

CE is usually diagnosed based on clinical symptoms but needs to be differentiated from similar ailments like ulcerative dermatosis, FMD, Bluetongue and Staphylococcal infections. The disease is proliferative and often self-limiting with lesions on the lips, oral mucosa and nostrils. Gross and histopathology are helpful. The virus can be demonstrated in scab lesions collected in an early phase through electron microscopy, but this cannot distinguish ORFV from other parapoxviruses. Molecular techniques like PCR, real-time PCR, loop-mediated isothermal amplification (LAMP) assay and genome sequencing can be used to detect and characterize the virus. Virus isolation can be attempted in cell cultures or embryonated eggs. Serological methods including serum neutralization test, ELISA, agar gel immunodiffusion (AGID), complement fixation and agglutination are also helpful.

Treatment

Being a viral disease, no treatment in particular is there, but supportive treatment with antibiotics protect against secondary infections. Topical cidofovir or cidofovir/ sucralfate can be useful. Local application of povidone iodine or iodine based ointment on the affected areas help prohibiting secondary infections. Anti-inflammatory drugs are also helpful. Fly repellants and larvicides prevent infestation of larvae of screwworms or other flies.

Prevention and Control

Certain practices are to be followed to prevent the disease in the herd. The new animals intended to be brought into the farm should be kept under quarantine before mingling with the pre-existing animals. Infected animals when segregated may help checking the virus spread. ICAR-Indian Veterinary Research Institute (IVRI), Mukteswar has developed a safe and potent live-attenuated Orf vaccine (Mukteswar 59/05 strain) using primary lamb testicle cells. Vaccination is practiced in some areas that can minimize the severity of the clinical signs. Cleaning and disinfection of sheds and utensils may help reduce the contamination in the environment.

Zoonotic Significance

Contagious Ecthyma being zoonotic, humans can develop lesions in 3-7 days on finger, hand or other body parts that tends to heal without scarring in 3-6 weeks. But one infected person does not infect others. It is therefore advisable that the animal handler of an affected animal should wear gloves and further wash his hands with hand-wash or sanitizer.

Conclusion

Contagious ecthyma is an infectious disease of goats and sheep causing significant financial losses affecting the productivity of small ruminants. The disease produces frank scabby and ulcerative lesions on muzzle, ears, lips, chin and nostril. The clinical picture of the disease as presented through several snaps taken in field situations at different farmers probably will help creating and spreading the awareness among the farming community and the readers that may help in preventing the disease among small ruminants reared by the farmers. The disease being zoonotic, people should follow necessary measures to safeguard themselves from the virus adopting different practices as discussed. Finally, vaccine and vaccination should be practiced for prevention and control of contagious ecthyma in small ruminants.

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