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Occurrence and pathology of vegetative endocarditis in sheep (*Ovis aries*)

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Abstract
The present study was undertaken to elucidate the occurrence of Vegetative endocarditis in sheep. A total 587 samples of cardiovascular system, irrespective of age, breed and sex were examined. Out of total 587 specimens, 147 specimens of heart, suspected for pathological abnormalities, were processed for histopathological examination. Vegetative endocarditis was recorded in 3 cases (2.04%). Grossly, heart showed roughened endocardium and vegetation. On microscopic examination cauliflower like growths on atrio-ventricular valves were seen. Infiltrative cells and bacterial clumps were seen in the vegetation.

Keywords: Sheep, heart, vegetative endocarditis, histopathology

Introduction
Sheep represent significant part of world livestock industry. Sheep (*Ovis aries*) is one of the oldest animals in the world, which was domesticated by man. Sheep had originated from their ancestors *Ovis orientalis* and *Ovis vignei* (Ensminger, 1970) [2] and plays important role in livestock farming industry in the rural and urban areas of world as well as in India. The total livestock population in the country is 535.78 Million (20th livestock census). The total population of sheep in India is 74.26 Million, with an increase by 14.1% over previous census (20th Livestock census). Sheep contribute to the tune of 13.87% to the total livestock population of the country. According to 20th livestock census, indigenous or non-descript sheep population is 70.17 Millions (94.49%) while exotic or crossbred sheep population is 4.09 Millions (5.51%). Rajasthan with 7.9 million sheep population is the 4th largest sheep rearing state of the country (20th livestock census).
The cardiovascular system is responsible for circulation of oxygenated and deoxygenated blood. It also helps in transporting nutrients (amino acids, electrolytes and sugar) and removing gaseous wastes from the body. Various endocrine hormones, excretory products are also transported by cardiovascular system. Therefore it becomes pertinent to study the cardiac affection in sheep. The present study was carried out for the occurrence and pathology of vegetative endocarditis in sheep.

Materials and Methods
In the present study, a total of 587 samples of cardiovascular system of sheep were examined grossly for pathological conditions. Out of these, 147 samples of heart, showing gross lesions, were collected in 10 per cent formal saline and processed for histo-pathological examination. Processing of tissues was done by paraffin embedding using acetone and benzene technique (Lillie, 1965) [4]. The tissue sections of 4-6 micron thickness were cut with help of hand operated microtone and stained as per haematoxylin and eosin staining method (Luna, 1968) [6].

Results and Discussion
The incidence of vegetative endocarditis in sheep in the present study was recorded as 2.04 per cent. Grossly, heart showed roughened endocardium and vegetation (Fig.1). The affected valves were having large, adhering, friable, yellow to grey masses of fibrin called vegetation that obstruct the valvular orifice. In chronic cases the fibrin deposit were organised by fibrinous connective tissue to produce irregular nodular masses called verrucae (Wart-like lesions). Macroscopically haemorrhagic areas were also seen on endocardial layer of ventricles. The above findings are in concurrence with those described by Mcintosh *et al.* (1967) [7] and Erasmus (1975) [3].

Microscopically, findings of endocarditis included infiltration of mononuclear and polymorphonuclear cells. Similar findings such as inflammatory cells and cauliflower like growths have also been reported by Watson *et al*., 2018 [9]. Thus present findings are in close approximation to the observations recorded by Watson *et al.*, 2018 [9]. The lesions consisting of layers of fibrin and numerous bacterial colonies were also seen (Fig. 2).The relative frequency of valvular involvement with endocarditis in animals is mitral, aortic, tricuspid and pulmonary. Focal necrotic endocarditis involving the two ventricles has also been recorded earlier by Abo-Shehada *et al.* (1991) [1].

This condition of heart might be due to infectious agents such as Streptococcal infection and Staphylococcal infection (Sastry and Rao, 2001).

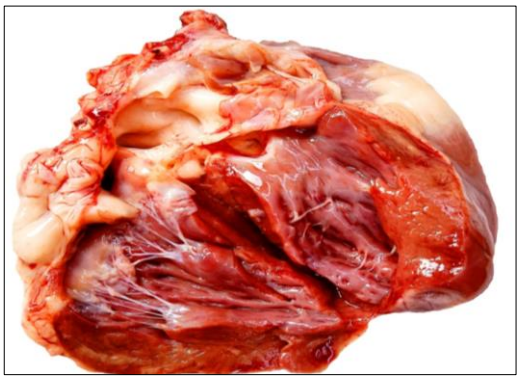

Fig 1: Photograph of heart of sheep showing vegetation and roughened endocardium

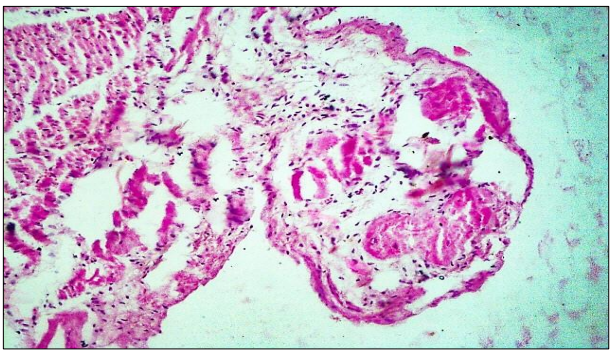

Fig 2: Microphotograph of heart of sheep showing vegetative endocarditis and cauliflower like growth (H&E, 200X)

Conclusion

The study considering the severity of vegetative endocarditis in heart of sheep. It can be concluded that this condition is serious pathological abnormality in domestic animals resulting in economic loss of the rural and urban farmer.

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