

An overview of different treatment strategies for the management of Bovine Respiratory Diseases

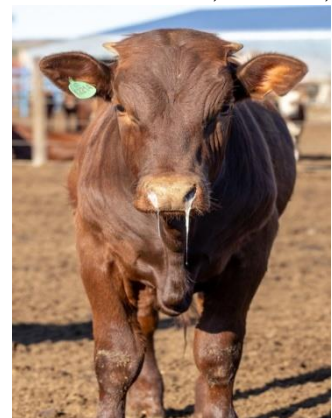
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Introduction

Livestock plays a significant role to enhance Indian economy through production of milk, meat, draught power and wool. The contribution of livestock sector in GDP is 4.11% and 25.6% of total agriculture GDP. To obtain maximum gain from livestock, it is necessary to rear their young ones into healthy and productive animals. Bovine respiratory diseases (BRD) are important cause of mortality and morbidity in young pre weaned calves and heifer. It is a complex disease caused by multiple pathogens concurrent with exposure to various stressors such as weaning, transportation, castration and ambient temperature. These conditions can cause immunosuppression and promote respiratory tract or lung infection. Wide range of pathogens are involved in the development of calves pneumonia include bacteria, viruses, parasites and fungi. Calves' pneumonia and shipping fever are important components of bovine respiratory disease which affecting calves from 2-6 months of age. Pneumonia that occurs in BRD characterized by fever, depression, and coughing, breathing difficulties and reduced appetite in pre weaned calves and heifers.

The existing therapy to prevent the respiratory infection among calves includes antimicrobials, vaccination, and improvement of animal environment and health status. Traditionally, numbers of medicinal plants are being used for the treatment because they are safe and affordable.



(Nasal discharge from BRD
(Source: <http://www.pir.sa.gov.au>)

In addition to conventional therapy, the article explores the utilization of certain herbal plants and their constituents in the management of bovine respiratory disease.

Pathogens and predisposing stressors in BRD

Intertwining of numerous pathogens and physiological stressors are the main etiology involved in development of respiratory diseases or pneumonia in bovines. The predisposing factors or stressors include transport, castration, dehorning, ambient temperature promote lung infection in animals by causing immunosuppression and enhance transmission and proliferation of various pathogens. Viruses are recognized as primary pathogens which further predispose the animal lung to secondary bacterial infection. Bovine herpes virus-1, Infectious bovine rhinotracheitis, Parainfluenza virus-3, Bovine respiratory syncytial virus, Bovine viral diarrhoea viruses are the important viruses involved in pathogenesis of bovine respiratory disease. Severe bacterial pneumonia is the most fatal form of BRD which caused by mainly gram-negative bacteria include *Pasteurella multocida*, *Mannheimia haemolytica*, *Histophilus somni*, and *Mycoplasma bovis*.

Antibiotics

To treat bovine respiratory diseases, antimicrobials therapy would be effective tool in calves. Selection and administration of appropriate antimicrobial in calves are important strategy to prevent reoccurrence of infection and death as well as to produce best treatment response among them. Most commonly used antimicrobials against respiratory diseases are long acting and administered systemically such as tetracyclines (long-acting oxytetracycline), macrolides (tulathromycin) & fluoroquinolones (enrofloxacin). In addition, Ceftiofur sodium at the doses rate of 1 mg/kg body weight is found to be effective for the treatment of respiratory diseases in calves through nebulization (aerosol therapy). Most of these antimicrobials are usually given at the time of clinical illness, soon after arrival of feedlot and before shipping for BRD control. Antimicrobials are effective measure to control and cure bovine respiratory disease in calves but increasing incidence of antimicrobial resistance make them ineffective now

Vaccination

Vaccination is a wide spread strategy associated with BRD against for viruses, and to some extent bacterial pathogens. The commercially available vaccines with different label specifications are Modified-live (MLV) and killed virus (KV) vaccines. It has found that vaccination shot with multivalent modified-live viral (MLV) vaccines alone or in combination with *Mannheimia haemolytica*/ *Pasteurella multocida* bacterins around the time of weaning can reduce bovine respiratory disease (BRD) associated mortality in calves. Currently, inconsistency in the reduction of mortality and morbidity in calves has been demonstrated by



a meta-analysis study which is might be due to decrease efficacy of BRD vaccines. Vaccination failure may occur due to involvement of various factors such as timing of vaccine administration, complex etiology of BRD, stress condition reduces efficacy of vaccines, and the increased susceptibility to various pathogens in stressed calves. To combat these above limitations, vaccination should be given before shipment of calves as part of a process termed preconditioning.

Traditionally used medicinal plant in BRD

The treatment of respiratory ailments, various medicinal plants are being used traditionally since from long. *Adhatoda vasica* is a popularly known medicinal plant used for the treatment of respiratory tract ailments such as common cold, cough, bronchitis and asthma in human. Specially, leaves of *Adhatoda vasica* possess anti-inflammatory, antimicrobial and anti-tussive properties which are contributed its medicinal uses.



Adhatoda vasica

(Source: Shamsuddin *et al.*, 2021)

Pistacia integerrima is a medicinal plant native to Asia and commonly called Zebrawood. Different components of this medicinal plant, particularly its galls, have been utilized in traditional medicine to treat asthma and cough. Other medicinal plant, *Terminalia chebulais* found in Taiwan, Tibet, India and China and its fruits are used for treatment of asthma and heart diseases in Ayurvedic and Chinese folk medicine. *Tinospora cordifolia* (Giloy, Guduchi, Amruta) is an immunoboosting plant and used as Rasayandravya in ayurveda.



Tinospora cordifolia

(Source: Mittal *et al.*, 2014)

The therapeutic properties of *Tinospora cordifolia*, including immunomodulator, anti-inflammatory, antipyretic, and antioxidant, are sufficient and it should be used as therapy and prevention in respiratory diseases.

Conclusion

The BRD complex remains a crucial issue and is likely to pose a significant challenge for the cattle industry in the future due to the intricate nature of its causative agents and the challenges associated with early diagnosis and treatment. The increasing antibiotic resistance of pathogens further complicates the situation, leading to a decrease in available treatment options. Consequently, apart from antibiotics the other treatment strategies can be explored.



Hence, this article provides an overview of different therapeutic strategies may be employed in the treatment of bovine respiratory diseases.

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