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Pneumonia in Goats and Sheep: Etiology, Signs, Control and Prevention

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Abstract

Pneumonia is one of the most important respiratory diseases affecting goats and sheep and continues to pose a major constraint to small ruminant production worldwide. The disease is associated with high morbidity, mortality, and significant economic losses due to reduced growth, decreased milk yield, increased treatment costs, and death, particularly in young animals. Pneumonia in small ruminants is multifactorial in nature and results from complex interactions between infectious agents, host immunity, and environmental and management-related stressors. Bacterial pathogens such as *Mannheimia haemolytica*, *Pasteurella multocida*, and *Bibersteinia trehalosi*, along with mycoplasmal agents including *Mycoplasma capricolum* subsp. *capripneumoniae*, *Mycoplasma mycoides* subsp. *capri*, and *Mycoplasma capricolum* subsp. *capricolum*, play a central role in the etiology of the disease. Viral infections further contribute by predisposing animals to secondary bacterial invasion. Clinically, pneumonia is characterized by fever, respiratory distress, coughing, nasal discharge, poor growth, and reduced productivity, with severe cases progressing to respiratory failure and death. Diagnosis relies on clinical evaluation supported by laboratory techniques such as bacterial culture, polymerase chain reaction, serological assays, and post-mortem examination. Effective prevention and control require an integrated approach emphasizing early diagnosis, appropriate antimicrobial therapy, improved housing and management, biosecurity measures, and vaccination where available. This article highlights the causes, clinical signs, diagnostic approaches, control and preventive strategies for pneumonia in goats and sheep, underscoring the importance of comprehensive disease management for sustainable small ruminant production.

Keywords: Goats, Sheep, Pneumonia, *Pasteurella multocida*, *Mannheimia haemolytica*, Mycoplasma

Introduction

Goats and sheep constitute an integral component of small ruminant production systems and contribute significantly to the rural economy by providing milk, meat, wool, and livelihood security to millions of farmers worldwide. The productivity and sustainability of small ruminant farming are closely linked to animal health, with respiratory diseases representing one of the major constraints. Among these, pneumonia remains a leading cause of morbidity, mortality, and economic loss in goats and sheep across different production systems. Pneumonia is characterized by inflammation of the lung parenchyma resulting from infectious and non-infectious factors. The disease often develops due to a complex interplay between pathogenic microorganisms, environmental stressors, and management-related factors such as overcrowding, poor ventilation, transportation stress, and sudden climatic fluctuations. Young kids and lambs are particularly susceptible, although animals of all age groups may be affected. The condition can rapidly spread within a flock, leading to reduced growth rates, decreased milk yield, increased treatment costs, and in severe cases, high mortality. Given its multifactorial nature and significant impact on animal productivity, early recognition and appropriate management of pneumonia are essential. A sound understanding of the etiological agents, clinical manifestations, diagnostic approaches, and preventive strategies is crucial for effective disease control. This article discusses pneumonia in goats and sheep with emphasis on its causes, clinical signs, diagnosis, and practical measures for control and prevention under field conditions.

Etiology

Members of the family *Pasteurellaceae* are most frequently implicated in pneumonic outbreaks in goats and sheep. *Mannheimia haemolytica* and *Pasteurella multocida* are commonly isolated from pneumonic lungs and are considered key etiological agents of bacterial bronchopneumonia. These organisms are often present as commensals in the upper respiratory tract and cause disease when host defenses are compromised by stress factors such as overcrowding, transport, poor ventilation, or sudden climatic changes. *M. haemolytica* is particularly associated with acute fibrinous pneumonia and pleuritis, while *P. multocida* is more commonly involved in suppurative bronchopneumonia and frequently acts as a secondary invader following viral infection. *Bibersteinia trehalosi* has also been reported in pneumonic cases of sheep and goats, either alone or in combination with other Pasteurellaceae, contributing to respiratory disease severity in certain outbreaks. Mycoplasmal organisms constitute another important group of pathogens associated with pneumonia in small ruminants. Unlike conventional bacteria, mycoplasmas lack a cell wall, making them

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inherently resistant to β-lactam antibiotics and difficult to eliminate once established in a herd. *Mycoplasma capricolum* subsp. *capripneumoniae* is the causative agent of contagious caprine pleuropneumonia (CCPP), a highly contagious and often fatal disease of goats characterized by severe fibrinous pleuropneumonia, respiratory distress, and high mortality rates. CCPP remains endemic in several regions of Africa, Asia, and the Middle East and is considered one of the most devastating respiratory diseases of goats. Other species such as *Mycoplasma mycoides* subsp. *capri* and *Mycoplasma capricolum* subsp. *capricolum* are also associated with pneumonia in goats and sheep, often as part of multisystemic infections involving joints, mammary glands, and eyes. Viral infections play a crucial role in the epidemiology of pneumonia by predisposing animals to secondary bacterial invasion. Viruses such as peste des petits ruminants virus (PPRV), parainfluenza virus type-3, and respiratory syncytial virus damage the respiratory epithelium and impair mucociliary clearance, thereby facilitating colonization of the lower respiratory tract by opportunistic bacteria and mycoplasmas. In field conditions, pneumonia in goats and sheep is therefore frequently polymicrobial, with viral, bacterial, and mycoplasmal agents acting synergistically to exacerbate disease severity and prolong recovery**.** Consequently, pneumonia should be regarded not merely as an infectious disease but as a management-associated syndrome requiring both veterinary and husbandry interventions for effective prevention and control.

Clinical Signs and Symptoms

Pneumonia in goats and sheep is primarily characterized by systemic illness accompanied by prominent respiratory signs. Affected animals commonly develop fever, depression, reduced feed intake, and lethargy. Respiratory manifestations include increased respiratory rate, coughing, nasal discharge, and laboured breathing. The nasal discharge is initially serous but may become mucopurulent or purulent, particularly in bacterial pneumonias caused by *Pasteurella multocida* and *Mannheimia haemolytica*. On auscultation, abnormal lung sounds such as crackles and wheezes may be detected, reflecting inflammation and consolidation of lung tissue. In severe cases, especially those associated with *Mycoplasma capricolum* subsp. *capripneumoniae*, animals exhibit marked respiratory distress, painful breathing, extension of the head and neck, and reluctance to move. Acute outbreaks may result in high morbidity and mortality, particularly in young kids and lambs. Chronic cases are characterized by persistent coughing, poor body condition, reduced growth rate, and decreased milk production. If left untreated, pneumonia may progress to respiratory failure or septicaemia, leading to death.

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Diagnosis

Accurate diagnosis of pneumonia in goats and sheep is essential for effective treatment and control, as clinical signs often overlap with other respiratory diseases. Field diagnosis is primarily based on clinical history, characteristic respiratory signs, and flock-level patterns such as sudden onset, rapid spread, and increased morbidity or mortality. Auscultation of the lungs may reveal abnormal sounds including crackles, wheezes, or reduced breath sounds, indicating lung consolidation or pleural involvement. Laboratory confirmation plays a crucial role in identifying the causative agents. Bacterial culture from nasal swabs, tracheal aspirates, or lung tissue helps in the isolation of pathogens such as *Pasteurella multocida* and *Mannheimia haemolytica*, along with antimicrobial susceptibility testing. However, culture alone may be time-consuming and sometimes inconclusive. Molecular techniques, particularly polymerase chain reaction (PCR), provide rapid and sensitive detection of bacterial and mycoplasmal pathogens, including *Mycoplasma capricolum* subsp. *capripneumoniae*, and are increasingly used in diagnostic laboratories. Serological tests such as ELISA are useful for herd-level surveillance and detection of exposure, especially in diseases like contagious caprine pleuropneumonia and peste des petits ruminants. In severe or fatal cases, post-mortem examination reveals lung consolidation, pleuritis, and fibrinous exudates, which support the diagnosis when correlated with laboratory findings. A combination of clinical assessment and laboratory techniques remains the most reliable approach for diagnosing pneumonia in goats and sheep.

Prevention and Control

Prevention and control of pneumonia in goats and sheep rely on a combination of good management practices, biosecurity measures, and timely veterinary intervention. Since pneumonia is often multifactorial, improving housing conditions plays a key role in disease prevention. Adequate ventilation, avoidance of overcrowding, protection from cold and damp weather, and reduction of dust and ammonia levels help in maintaining respiratory health. Proper nutrition, regular deworming, and ensuring adequate colostrum intake in newborn kids and lambs strengthen immunity and reduce susceptibility to respiratory infections. Biosecurity measures are essential to limit the introduction and spread of pathogens within flocks. Newly purchased or sick animals should be quarantined or isolated and closely monitored for respiratory signs. Mixing of animals from different sources, especially during transport or at markets, should be minimized. Stressful events such as long-distance transportation, abrupt dietary changes, and poor handling should be avoided, as stress significantly predisposes animals to pneumonia. Treatment mainly involves the early use of appropriate antibiotics to

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control secondary bacterial infections, along with supportive therapy. Antibiotics such as tetracyclines, macrolides, or fluoroquinolones are commonly used based on veterinary advice and antimicrobial sensitivity patterns. However, in mycoplasmal infections, treatment may reduce clinical severity but may not completely eliminate the organism, making prevention even more important. Anti-inflammatory drugs, fluid therapy, and improvement of environmental conditions support recovery in affected animals. Vaccination forms an important preventive strategy where available. Vaccines against pasteurellosis and contagious caprine pleuropneumonia have been shown to reduce disease incidence and severity in endemic regions. Regular health monitoring and early isolation of affected animals further help in limiting disease spread. Overall, an integrated approach combining good husbandry, biosecurity, vaccination, and rational use of antibiotics is essential for effective prevention and control of pneumonia in goats and sheep.

Conclusion

Pneumonia remains one of the most significant health challenges affecting goats and sheep, leading to substantial economic losses due to reduced productivity, increased treatment costs, and mortality. The disease is multifactorial, involving bacterial, mycoplasmal, and viral agents acting in conjunction with environmental and management-related stressors. Early recognition of clinical signs, accurate diagnosis, and prompt intervention are critical for reducing disease severity and limiting flock-level spread. Since treatment alone may not be sufficient, especially in chronic and mycoplasmal infections, emphasis should be placed on preventive strategies including good housing, biosecurity, vaccination where available, and sound management practices. An integrated approach to prevention and control is therefore essential for maintaining respiratory health, improving productivity, and ensuring the sustainability of small ruminant farming systems.

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