

Pasteurellosis: A multifactorial bacterial disease in veterinary medicine with zoonotic implications

Aswin R. Khairullah¹, Sri S. Prihandani^{1*}, Bima P. Pratama², Susan M. Noor¹, Arif N.M. Ansori³, Susanti Susanti¹, Prima M. Widiyanti¹, Syahputra Wibowo⁴, Andriani Andriani¹, Ricadonna Raissa⁵, Sutiastuti Wahyuwardani¹, Riki Warman⁶, Faidah Rachmawati¹, Yudi Adinata⁷, Wasito Wasito¹, Fadhlullah Ramadhani⁸, Rahmat S. Adji¹, Safika Safika⁹

¹Research Center for Veterinary Science, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, Bogor, 16911, West Java, Indonesia.

²Research Center for Process Technology, National Research and Innovation Agency (BRIN), KST BJ Habibie, Serpong, South Tangerang, 15314, Banten, Indonesia.

³Postgraduate School, Universitas Airlangga, Kampus B Dharmawangsa, Jl. Airlangga 4-6, Surabaya, 60286, East Java, Indonesia.

⁴Eijkman Research Center for Molecular Biology, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, Bogor, 16911, West Java, Indonesia.

⁵Department of Pharmacology, Faculty of Veterinary Medicine, Universitas Brawijaya, Jl. Puncak Dieng, Kuncu, Kalisongo, Dau, Malang, 65151, East Java, Indonesia.

⁶Research Center for Estate Crops, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, Bogor, 16911, West Java, Indonesia.

⁷Research Center for Animal Husbandry, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, Bogor, 16911, West Java, Indonesia.

⁸Research Center for Geoinformatics, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, Bogor, 16911, West Java, Indonesia.

⁹IPB University Jl. Raya Dramaga, Kampus IPB Dramaga, Bogor, 16680, West Java, Indonesia.

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*Correspondence:

Corresponding author: Sri Suryatmiati Prihandani
E-mail address: sri2suryatmiati@gmail.com

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ABSTRACT

Pasteurella multocida, an opportunistic Gram-negative bacterium found in many domestic and wild animal species, is the main cause of pasteurellosis, a bacterial infection. The illness is found all over the world and presents with a wide range of clinical symptoms, from acute septicemia, which is frequently fatal, to respiratory tract infections. A complicated interplay between bacterial virulence, host immunological status, environmental conditions, and husbandry management significantly affects the occurrence of pasteurellosis. Clinical infections are largely caused by predisposing conditions such as stress, population density, hunger, climate change, and respiratory virus infections. *P. multocida* has a number of pathogenic virulence features, such as a polysaccharide capsule that prevents phagocytosis, lipopolysaccharide (LPS) as an endotoxin, and several toxins in certain strains that can harm tissue and dysregulate host cells. Extensive tissue damage, especially in the respiratory system and other critical organs, is frequently caused by an overreaction of the immune system to this illness. A thorough diagnosis of pasteurellosis necessitates a combination of pathological analysis, clinical observation, and laboratory confirmation using molecular methods like PCR and bacterial culture. Vaccination, stringent biosecurity procedures, better husbandry management, and proper antibiotic medication are the main control measures. However, incorporating these strategies within the livestock system is crucial for effective control. Due to decreased productivity, mortality, and high control costs, pasteurellosis not only affects animal health but also has major economic ramifications. With a focus on origins, epidemiology, pathogenesis, clinical symptoms, diagnosis, and control measures, this review attempts to give a thorough overview of pasteurellosis. The animal health system can use this review as a scientific resource to create efficient disease preventive and control initiatives.

Introduction

A bacterial infection of great importance to veterinary medicine and the world's livestock business is pasteurellosis (Wilson and Ho, 2013). *Pasteurella multocida*, an opportunistic, Gram-negative, coccobacillus-like bacterium, is the main culprit (Tawor *et al.*, 2025). This bacterium is naturally present in the mucosa, oral cavity, and upper respiratory tract of a variety of domestic and wild animals (Piorunek *et al.*, 2023). The presence of *P. multocida* does not result in clinical signs under normal physiological conditions (Wei *et al.*, 2025). However, these bacteria can become an invasive pathogen and cause a wide range of clinical illnesses when the host, agent, and environment are out of balance (Boyce and Adler, 2006).

Pasteurellosis can present with a wide range of clinical symptoms, from acute, frequently lethal systemic forms to localized respiratory infections (Hasani *et al.*, 2024). The illness frequently manifests as fibrinopurulent pneumonia, bronchopneumonia, and quickly developing septicemia in livestock, including sheep, goats, and cattle (Haque *et al.*, 2023). Pasteurellosis, sometimes referred to as chicken cholera, can quickly result in outbreaks with significant death rates in poultry (Geda, 2024). In contrast, the illness typically manifests as chronic respiratory symptoms in rabbits, including sinusitis, rhinitis, and recurrent pneumonia (D'Amico *et al.*, 2022). This clinical diversity suggests that pasteurellosis is a complicated infectious condition impacted by multiple factors rather than a single disease entity (Asaeda *et al.*, 2024).

From the standpoint of pathogenesis, *P. multocida* has a number of virulence factors that contribute to its capacity to infect and harm tissues

(Xu *et al.*, 2023). While lipopolysaccharide (LPS) functions as an endotoxin and causes a systemic inflammatory response, the polysaccharide capsule shields the bacteria from phagocytosis (Harper and Boyce, 2017). Additionally, certain strains release *Pasteurella multocida* toxin (PMT), which can worsen tissue damage and interfere with host cell control (Wilson and Ho, 2012). This confluence of processes results in lung tissue damage, increased inflammation, and the possibility of septicemia (Fu *et al.*, 2024).

According to epidemiology, pasteurellosis is widespread and can be found in practically every part of the world without regard to geographical limits (Allen *et al.*, 2025). Environmental variables, husbandry practices, animal immunity, and population density all have an impact on disease occurrence (El-Demerdash *et al.*, 2023). Transportation, weather variations, malnourishment, and respiratory virus infections are examples of stress factors that are frequently the main causes of clinical illness (Woyessa and Umer, 2023). Consequently, pasteurellosis is sometimes classified as an opportunistic illness that arises when the host's defenses are compromised (Vesza *et al.*, 2017).

Due to high mortality rates, decreased production, and expensive treatment and control costs, this disease has a substantial economic impact in addition to its effects on animal health (Jahromi *et al.*, 2025). Additionally, although human cases are very uncommon, certain strains of *P. multocida* have the ability to spread disease, especially through direct contact with infected animals (Köndgen *et al.*, 2011).

Because of its intricacy, a comprehensive understanding of pasteurellosis is essential to supporting successful field prevention and control initiatives. Therefore, the purpose of this review was to comprehensively

examine the etiology, epidemiology, pathogenesis, clinical manifestations, diagnosis, and control strategies of pasteurellosis, thereby providing a comprehensive scientific overview as a basis for improving animal health management and reducing the devastating impact of this disease.

Etiology

P. multocida is the main etiologic agent of pasteurellosis, an infectious disease caused by bacteria belonging to the genus *Pasteurella* (Piorunek et al., 2023). This bacterium is facultatively anaerobic, short, coccobacilli-shaped, non-spore-forming, and non-motile (Peng et al., 2019). *P. multocida* is an opportunistic pathogen that is commonly found as normal flora in the oral cavity, upper respiratory tract, and mucosa of both domestic and wild animals (Razali et al., 2020).

Based on somatic and capsule antigens, *P. multocida* is classified into a number of serotypes (Christensen et al., 2022). This bacterium is divided into many major groups (A, B, D, E, and F) according to capsular classification, each of which has unique relationships with host species and clinical symptoms (Tawor et al., 2025). For instance, types B and E are more commonly linked to septicemia in ruminants in some areas, but type A is usually linked to respiratory tract infections in birds and mammals (Tsfaye et al., 2025). Additionally, antigenic variation between strains is distinguished by somatic classification based by LPS (D'Amico et al., 2024).

Apart from *P. multocida*, a number of other species that were formerly part of the genus *Pasteurella* can also cause comparable disease syndromes (Smallman et al., 2025). These include some subspecies of *P. multocida* that have different levels of virulence and *Mannheimia haemolytica* (formerly *Pasteurella haemolytica*), which is important in the respiratory disease complex in ruminants (Garzon et al., 2025). However, *P. multocida* continues to be the principal etiologic agent most commonly found in the context of classic pasteurellosis (Wilson and Ho, 2013).

A polysaccharide capsule that prevents phagocytosis, LPS that works as an endotoxin, and several adhesin proteins that facilitate colonization of host epithelial surfaces are some of the elements that characterize *P. multocida*'s virulence (Harper et al., 2012). Additionally, some strains produce PMT, which contributes to the pathophysiology of chronic illness, especially in swine infections (Kubatzky, 2022).

Epidemiology

Pasteurellosis is a bacterial infectious illness that affects many animal species in practically every part of the world (Mostaan et al., 2020). *P. multocida*, the main causal agent, is highly prevalent in livestock ecosystems with both intensive and extended husbandry systems because it is widely dispersed as a commensal in the upper respiratory tract and mucosa of domestic and wild animals (Tabatabaei and Abdolahi, 2023). Although there are no geographical restrictions on the disease, environmental factors, husbandry practices, and stressors affecting the animal population have a significant impact on its incidence and clinical presentations (Abbas et al., 2023). Table 1 presents an overview of the epidemiology of pasteurellosis based on host species, geographic distribution, predominant clinical manifestations, and disease characteristics across various husbandry systems.

Pasteurellosis in ruminants, especially cattle and buffalo, is commonly reported as pneumonia and septicemia worldwide, especially in tropical and subtropical regions that promote bacterial growth and raise animal heat stress (Lestari et al., 2025). The illness is a key part of the bovine respiratory disease complex (BRDC) in nations with intensive livestock industries, such as the United States, Brazil, Australia, and several European nations (Soike et al., 2012; Kuchiishi et al., 2023; Truswell et al., 2023; Pintér et al., 2024; Maddock et al., 2025). The disease causes substantial economic losses because of decreased production and mortality (Tsfaye et al., 2025).

Pasteurellosis, often known as chicken cholera, is extremely common in poultry and has been documented on several continents, including Asia, Africa, Europe, and the Americas (Muhairwa et al., 2001; Dahl et al., 2002; Mwasunda et al., 2022; Aliza et al., 2024; Allen et al., 2024). High-mortality outbreaks of this illness are common, particularly in conventional or semi-intensive farming systems with inadequate biosecurity (Mohamed and Mageed, 2014). Chicken cholera is still a serious bacterial illness that affects the local poultry sector in various poor nations (Geda, 2024).

Pasteurellosis affects both domestic and commercial populations of rabbits worldwide (Iorgoni et al., 2026). With long-term clinical symptoms such pneumonia, otitis media, and rhinitis, this infection is frequently prevalent in rabbit farms (Yang et al., 2022). Due to decreased growth and

Table 1. Epidemiology of pasteurellosis based on host species, geographic distribution, and disease characteristics.

Host group	Geographic distribution	Predominant clinical form	Epidemiological characteristics	Major impact	References
Ruminants (cattle and buffalo)	Worldwide (especially tropical and subtropical regions; United States, Brazil, Australia, Europe, Asia, and Africa)	Pneumonia, septicemia	Frequently associated with bovine respiratory disease complex (BRDC); incidence influenced by stress, environmental conditions, and intensive husbandry systems	High mortality and substantial economic losses due to decreased productivity	Lestari et al. (2025); Soike et al. (2012); Kuchiishi et al. (2023); Truswell et al. (2023); Pintér et al. (2024); Maddock et al. (2025); Tsfaye et al. (2025)
Poultry	Worldwide (Asia, Africa, Europe, and the Americas)	Fowl cholera (acute outbreaks)	Rapid transmission, particularly in traditional and semi-intensive farming systems with inadequate biosecurity	High mortality within a short period and significant impact on local poultry production	Muhairwa et al. (2001); Dahl et al. (2002); Mwasunda et al. (2022); Mohamed and Mageed (2014); Aliza et al. (2024); Allen et al. (2024); Geda (2024)
Rabbits	Worldwide (domestic and commercial production systems)	Chronic rhinitis, pneumonia, otitis media	Commonly endemic in rabbit farms; infections are often chronic and persistent	Reduced growth performance and reproductive efficiency, causing economic losses	Yang et al. (2022); El-Sheikh et al. (2021); Iorgoni et al. (2026)
Wild animals (reservoir hosts)	Worldwide (natural and open ecosystems)	Subclinical infection or asymptomatic carrier state	Act as natural reservoirs of <i>Pasteurella multocida</i> and maintain pathogen circulation in wildlife populations	Sustains the natural infection cycle and contributes to pathogen persistence	Abreu et al. (2018)
Mixed domestic-wild populations	Regions with open ecosystem interactions	Variable depending on host species	Cross-species transmission facilitated by interactions between domestic and wild animals	Increases the risk of broad geographic dissemination and maintenance of infection	Miao et al. (2026)

reproductive performance, this disease may result in financial losses for the rabbit farming sector (El-Sheikh *et al.*, 2021).

Apart from livestock, *P. multocida* can also be found in wild animals, which serve as natural reservoirs and sustain the infection cycle in the natural world (Abreu *et al.*, 2018). The global spread of this bacterium is facilitated by interactions between domestic and wild animals, particularly in regions with open ecosystems (Miao *et al.*, 2026). The etiological features and epidemiological distribution of pasteurellosis across major animal hosts are summarized in Figure 1.

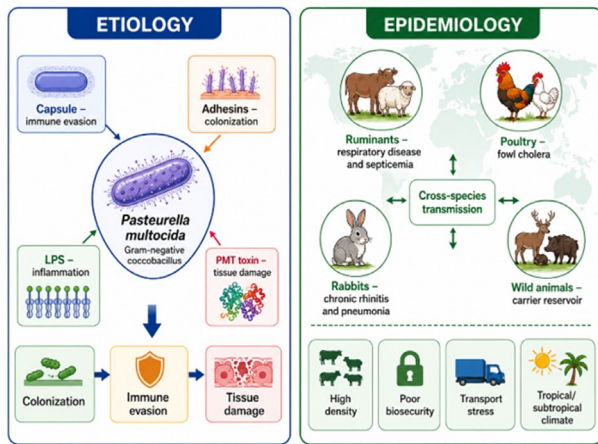


Figure 1. Etiology and epidemiological characteristics of pasteurellosis.

Pathogenesis

When the bacteria successfully penetrate and colonize mucosal surfaces, especially the upper respiratory tract, pasteurellosis pathogenesis commences (Mahony *et al.*, 2023). *Pasteurella* can live as opportunistic flora under normal circumstances without producing any symptoms (Lagadinou *et al.*, 2024). However, the equilibrium between the host and the bacteria is upset when the host's defenses are compromised by stress, environmental changes, transit, heavy crowding, starvation, or respiratory virus infections (Li *et al.*, 2026). This allows the bacteria to multiply quickly (Boyce and Adler, 2006).

Following initial colonization, the bacteria use a variety of virulence factors to infiltrate mucosal tissue (Yang *et al.*, 2022). The polysaccharide capsule, which shields the bacteria from host immune cells' phagocytosis and increases their survivability within the body, is one crucial component (Harper *et al.*, 2012). Additionally, the bacterial cell wall component lipopolysaccharide (LPS) functions as a potent endotoxin by binding to the Toll-like receptor 4 (TLR4)/MD-2/CD14 receptor complex on host immune cells (Arya *et al.*, 2025). This interaction activates the MyD88- and TRIF-dependent signaling pathways, resulting in nuclear factor-kappa B (NF- κ B) and mitogen-activated protein kinase (MAPK) activation, followed by increased transcription of pro-inflammatory cytokines, including Tumor Necrosis Factor-alpha (TNF- α), Interleukin-1 β (IL-1 β), and Interleukin-6 (IL-6), thereby amplifying the inflammatory response (Periasamy *et al.*, 2018). In toxigenic strains, PMT further enhances pathogenicity by constitutively activating heterotrimeric G proteins through deamidation of G α subunits (Orth *et al.*, 2009). This activation stimulates downstream signaling cascades, including RhoA, phospholipase C β (PLC β), protein kinase C (PKC), and MAPK pathways, leading to cytoskeletal rearrangement, increased cell proliferation, inhibition of osteoblast differentiation, activation of osteoclasts, and dysregulated inflammatory responses that contribute to progressive tissue injury (Kubatzky *et al.*, 2013).

Bacteremia can result from bacteria breaking through the epithelial barrier and entering the bloodstream when the local infection worsens (Kukrety *et al.*, 2016). This makes it possible for the germs to spread to a number of target organs, including the liver, lungs, pleura, and cardiovascular system (Piorunek *et al.*, 2023). The activation of NF- κ B and MAPK signaling pathways also promotes sustained production of inflammatory

mediators, including TNF- α , IL-1 β , IL-6, and chemokines that recruit neutrophils and macrophages to the site of infection (Xu *et al.*, 2023). These mediators contribute to the development of systemic symptoms like fever, anorexia, and weakness (Marza *et al.*, 2015). But an overabundance of inflammation can worsen tissue damage and hasten the onset of septicemia (Kuwahara and Imanaka, 2026).

In more advanced stages, bacterial toxins and an unchecked inflammatory response are the main causes of tissue destruction (Zhao *et al.*, 2024). Fibrinopurulent lung inflammation, marked by tissue consolidation, exudate buildup, and extensive neutrophil infiltration, is observed in the pneumonic type of pasteurellosis (Lnu *et al.*, 2022). Acute septicemia, on the other hand, can develop quickly and result in endotoxic shock, which can cause multiorgan failure and unexpected death (Pena *et al.*, 2018). The sequential process of colonization, immune activation, tissue damage, and systemic progression in pasteurellosis is illustrated in Figure 2.

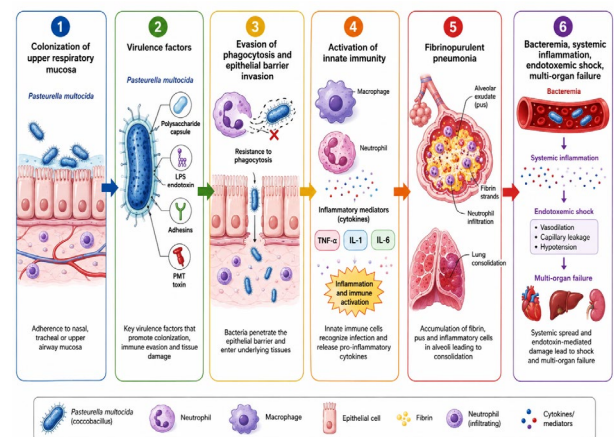


Figure 2. Pathogenesis and host immune response in *P. multocida* infection.

Immune response

Both innate and adaptive immunological processes are involved in the immune response to *P. multocida* infection, and both are important in determining the severity of the illness (Kubatzky, 2012). However, in many pasteurellosis cases, the host immune response not only fails to eradicate the pathogen but also causes excessive inflammation that damages tissue (Liu *et al.*, 2025).

The innate immune system acts as the first line of defense during the early stages of infection by using pattern recognition receptors, especially Toll-like receptors (TLRs) on macrophages and epithelial cells, to identify bacterial components like lipopolysaccharide (LPS) (Harper and Boyce, 2017). Pro-inflammatory mediators like interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF- α) are released when these receptors are activated (Chakraborty *et al.*, 2017). These mediators contribute to increasing phagocytic activity and attracting neutrophils to the infection site (Fu *et al.*, 2024). However, the bacterial polysaccharide capsule in *P. multocida* infection can prevent opsonization and phagocytosis, reducing the efficiency of neutrophils and macrophages in eliminating the pathogen (Jiang *et al.*, 2025).

In the acute inflammatory response of pasteurellosis, especially in pneumonia cases, neutrophils predominate (Lu *et al.*, 2023). Reactive oxygen species (ROS) and proteolytic enzymes are released as a result of massive neutrophil activation (Yang *et al.*, 2026). These substances are intended to destroy the bacteria but can instead seriously harm lung tissue (Effah *et al.*, 2021). This aids in the development of the tissue consolidation and fibrinopurulent exudate that are hallmarks of pasteurellosis pneumonia (John *et al.*, 2017). Additionally, the bacteria's capacity to linger in the tissue prolongs the inflammatory activation, creating a vicious cycle of inflammation (Li *et al.*, 2026).

B and T cell activation also contributes to the adaptive immune re-

sponse (Kachoei *et al.*, 2017). Opsonization and toxin neutralization are facilitated by the production of certain antibodies by B lymphocytes against *P. multocida* antigens (Prihandani *et al.*, 2025). However, because the illness progresses quickly, the antibody response's efficacy is frequently restricted in the early stages of an acute infection (Yassein *et al.*, 2021). T lymphocytes, on the other hand, are involved in immune response regulation and macrophage activation (Sun *et al.*, 2024). However, immunological dysregulation can make systemic inflammation worse in cases of severe infections (Zhao *et al.*, 2024).

The immune response may develop into an excessive systemic inflammatory response syndrome (SIRS) in conditions of septicemia or systemic infection (Yang *et al.*, 2022). Large-scale cytokine release (cytokine storm) is the hallmark of this illness, which results in hypotension, increased vascular permeability, vasodilation, and compromised tissue perfusion (Nie *et al.*, 2025). Endotoxic shock may arise from this, which could cause multiorgan failure (Giorgetti *et al.*, 2025).

Pathology

Pasteurellosis can cause a wide range of clinical diseases, from systemic lesions in situations of severe septicemia to local alterations in the respiratory tract (Wei *et al.*, 2025). The host's health, the bacterial strain's pathogenicity, and the clinical presentation all have a significant impact on the disease's pathological characteristics (Cao *et al.*, 2024). Importantly, the pathological manifestations of *P. multocida* are species-specific and vary according to the capsular serogroup and associated virulence factors. Classical disease syndromes include hemorrhagic septicemia (HS) in cattle and buffaloes, fowl cholera in poultry, and progressive atrophic rhinitis (PAR) in pigs, each characterized by distinct pathological features (Lestari *et al.*, 2025).

In cattle and buffaloes affected by hemorrhagic septicemia, lesions are predominantly systemic due to acute septicemia caused by capsular serogroups B and E (Hussaini *et al.*, 2020). Gross lesions typically include severe subcutaneous edema of the throat and brisket, generalized congestion, petechial and ecchymotic hemorrhages, enlarged hemorrhagic lymph nodes, pulmonary edema, and serosal hemorrhages resulting from endotoxemia and vascular injury (Shome *et al.*, 2024).

In poultry, fowl cholera may occur in acute or chronic forms. Acute disease is characterized by septicemia with multifocal hepatic necrosis, splenomegaly, pulmonary congestion, and widespread petechial hemorrhages (Geda, 2024). In contrast, chronic fowl cholera commonly presents with localized suppurative lesions, including fibrinous pericarditis, airsacculitis, pneumonia, arthritis, sinusitis, and caseous exudates in the wattles and joints (Blakey *et al.*, 2019).

In pigs, toxigenic strains producing PMT cause progressive atrophic rhinitis, which is characterized by degeneration of the nasal turbinate bones, osteoclastic bone resorption, fibrosis, distortion of the nasal septum, and facial deformities (Horiguchi, 2012). These lesions differ markedly from the septicemic syndrome observed in ruminants because they primarily result from the biological activity of PMT rather than overwhelming bacteremia (Magyar *et al.*, 2013).

The lungs and lower respiratory tract are the main sites of lesions in the pneumonic type (Ozyildiz *et al.*, 2013). Due to the buildup of inflammatory exudate, the lungs are usually consolidated, grayish red to dark red, and have increased tissue density (Marru *et al.*, 2013). The pleural surfaces frequently exhibit fibrinous pleurisy, where adhesions between the lungs and the chest wall or between the lung lobes are caused by fibrin deposits (Maes *et al.*, 2023). A suppurative or fibrinopurulent bronchopneumonia may be indicated in more advanced instances when mucopurulent exudate fills the bronchi and bronchioles (Uenoyama *et al.*, 2020). Additionally, local infections often result in regional lymph node enlargement (Zhao *et al.*, 2026).

Massive neutrophil infiltration in the alveoli, bronchioles, and interstitium, along with the buildup of fibrin, cellular debris, and edema, are the

microscopic characteristics of lung lesions (Bhat *et al.*, 2016). Proteolytic enzymes and inflammatory mediators generated during the immune response cause damage to alveolar walls (Carvalho and Stevenson, 2022). Sometimes the combined effects of local hypoxia and bacterial toxins can cause localized necrosis of lung tissue (Yuan *et al.*, 2024). Additionally, there may be mild to moderate vasculitis, which increases vascular permeability and causes fibrin exudate to develop (Vesza *et al.*, 2017).

Pathological lesions in the septicemic form affect several important organs and are more widespread (Doyle-Baker *et al.*, 2020). The serosal surfaces of organs like the heart, liver, kidneys, and intestines frequently exhibit petechial and ecchymotic hemorrhages, which indicate vascular impairment brought on by endotoxemia (Horadagoda *et al.*, 2001). The liver may show localized necrosis, congestion, and hepatocellular degeneration (Yuan *et al.*, 2024). Impaired perfusion frequently causes tubular degeneration and congestion in the kidneys (Pena *et al.*, 2018). A systemic infection may cause the spleen to expand and experience red pulp hyperplasia (Piorunek *et al.*, 2023).

Death may occur in extremely acute instances without visible macroscopic lesions other than pulmonary edema and widespread congestion, indicating a very quick course of the illness (Vogt *et al.*, 2026). This is frequently linked to the effects of endotoxin, which causes multi-organ failure and circulatory shock prior to the development of overt inflammatory lesions (Ruiz-Rodríguez *et al.*, 2022).

Although inflammation is a common pathological response in pasteurellosis, the dominant lesions differ substantially among host species. Hemorrhagic septicemia is characterized by fulminant septicemia and vascular injury in ruminants, fowl cholera by acute septicemia or chronic fibrinopurulent lesions in poultry, and progressive atrophic rhinitis by toxin-mediated osteolysis and turbinate atrophy in pigs (Lestari *et al.*, 2025).

In general, the pathophysiology of pasteurellosis is a result of a combination of the pathogen's direct harm and the host's heightened inflammatory reaction (Mussayeva *et al.*, 2025). A wide range of illnesses, from localized respiratory tract infections to deadly septicemia involving systemic multi-organ failure, are reflected in the variety of lesions found (Wei *et al.*, 2025).

Clinical manifestations

Depending on the host species, the type of disease, and the severity of the infecting *P. multocida*, the clinical signs of pasteurellosis can differ significantly (Wilson and Ho, 2013). Respiratory distress and fast increasing systemic indications are the main symptoms of the disease, which can generally emerge as acute, subacute, or chronic forms (Hasani *et al.*, 2024). Pasteurellosis frequently progresses quickly, making clinical signs increase quickly, especially in the septicemic variant (Haque *et al.*, 2023).

Initial signs of the pneumonic form typically include melancholy or lethargy, decreased appetite, and a raised body temperature (fever) (Kabeta *et al.*, 2015). Animals who are infected frequently have a dry or productive cough, dyspnea (difficulty breathing), and tachypnea (increased respiratory rate) (El Amri *et al.*, 2025). Nasal discharge, first serous and subsequently mucopurulent, may be seen as the illness worsens (Gaudino *et al.*, 2022). In more serious situations, lung consolidation and exudate buildup in the respiratory system may cause animals to make strange breath noises (Hasani *et al.*, 2024).

The pneumonic form in swine and ruminants is frequently linked to secondary infections after respiratory virus infections or stress, which can cause clinical signs to worsen more quickly (Abbas *et al.*, 2023). Due to chronic starvation, infected animals also show signs of dehydration, diminished performance, and general frailty (Doyle-Baker *et al.*, 2020).

Clinical signs of the septicemic variety, on the other hand, manifest more quickly and frequently result in death (Wei *et al.*, 2025). High fever, severe sadness, complete anorexia, and great frailty are early indicators (Aliza *et al.*, 2024). Due to poor perfusion, animals may exhibit symptoms of circulatory impairment, such as cold extremities and pale or cyanotic

mucosa (Chung *et al.*, 2015). Sometimes a sudden death occurs without any prior clinical symptoms (Lestari *et al.*, 2025).

Pasteurellosis, sometimes known as chicken cholera, is characterized in chickens by very evident systemic signs, such as diarrhea, reduced egg production, and abrupt, widespread mortality in acute epidemics (Geda, 2024). The illness is frequently chronic in rabbits and is characterized by "snuffles," persistent upper respiratory tract infections, sneezing, and a prolonged nasal discharge (Abd El-Ghany, 2023).

Diagnosis

A combination of pathological abnormalities, clinical symptoms, and test confirmation that *P. multocida* is the causal agent are used to diagnose pasteurellosis (Iorgoni *et al.*, 2026). An accurate diagnosis necessitates a complete strategy that combines history taking, clinical examination, and supportive diagnostic testing because the clinical signs of this disease frequently coincide with those of other bacterial or respiratory virus infections (Alsaaffara and Jones, 2014).

Clinically, animals with acute respiratory symptoms like fever, dyspnea, cough, and mucopurulent nasal discharge may be suspected of having pasteurellosis, particularly if these symptoms are preceded by predisposing factors like stress, transportation, environmental changes, or respiratory viral infections (Abbas *et al.*, 2023). *Pasteurella* infection can also be clearly indicated in the septicemic type by abrupt death with few symptoms or systemic hemorrhage (Risco *et al.*, 2013).

By separating and identifying the bacteria from clinical samples such nose swabs, blood, pleural fluid, or lung tissue, a laboratory examination is used to confirm the diagnosis (Dubie *et al.*, 2026). Typical *P. multocida* colonies grow in bacterial culture on suitable nutrient media (Hanchanachai *et al.*, 2021). This can be verified by biochemical tests like sugar fermentation, a positive indole test, and microscopic morphology, which is typified by bipolar Gram-negative bacilli (Desem *et al.*, 2023). Direct preparations stained with Gram stain frequently exhibit a distinctive "safety pin appearance" (Shivachandra *et al.*, 2011).

Molecular techniques like polymerase chain reaction (PCR) are extremely sensitive and specific diagnostic tools for identifying particular *P. multocida* genes, in addition to culture approaches (Geda *et al.*, 2025). Even in samples with low bacterial counts or in the early stages of infection, this technique enables quick identification (Kumar *et al.*, 2009). Additionally, strain characterisation and epidemiological research benefit greatly from the application of PCR (Shirzad-Aski and Tabatabaei, 2016).

The diagnosis may also be supported by a histopathological study,

particularly when mortality is involved (Walsh *et al.*, 2026). Although they are not specific without microbiological proof, lesions like fibrinopurulent pneumonia, edema, and tissue necrosis with a significant neutrophil infiltration can corroborate the diagnosis of pasteurellosis infection (Griffin, 2010).

Differential diagnosis

Because pasteurellosis shares many clinical signs and pathological abnormalities with other infectious illnesses, especially those that damage the respiratory system and produce septicemia in animals, a differential diagnosis is required (Abdulai *et al.*, 2026). It is frequently challenging to determine a diagnosis based only on clinical signs and gross lesions because symptoms including fever, dyspnea, cough, mucopurulent discharge, and sudden death are identical (Umer and Mezgebu, 2023). Table 2 presents the differential diagnosis of pasteurellosis based on disease group, causative agent, host species, and similarities in clinical and pathological manifestations.

It is important to differentiate pasteurellosis in its pneumonic form from other bacterial respiratory illnesses such *Mannheimia haemolytica* infection, which also results in fibrinopurulent pneumonia in ruminants (Jesse *et al.*, 2019). Similar lung abnormalities, such as pleurisy, fibrinous exudate, and lobular consolidation, can be caused by both drugs (Onizuka *et al.*, 2024). Additionally, because *Histophilus somni* infection can result in pneumonia, pleurisy, and septicemia with vascular lesions resembling pasteurellosis, it is a crucial differential diagnosis (O'Toole and Sondgeroth, 2016). *Actinobacillus pleuropneumoniae* infection in pigs should also be taken into consideration because it can induce necrotic-hemorrhagic lung lesions that resemble acute pasteurellosis (Menzel *et al.*, 2014).

Viral respiratory illnesses are crucial differential diagnoses in addition to bacterial infections (Wei *et al.*, 2025). The respiratory epithelium can be damaged by viral infections including bovine respiratory syncytial virus (BRSV), bovine herpesvirus-1 (IBR), and influenza in different species (Kirchhoff *et al.*, 2014). This is followed by secondary bacterial infections such *P. multocida*. Without laboratory testing, it is challenging to identify the causative agent in these patients because the lesions frequently develop from mixed infections (Piorunek *et al.*, 2023).

Pasteurellosis, often known as chicken cholera, must be distinguished in poultry from illnesses like avian influenza and Newcastle disease, which can similarly result in abrupt mortality, systemic bleeding, and significant output declines (Geda, 2024). Due to the significant death rates associ-

Table 2. Differential diagnosis of pasteurellosis based on disease group, etiological agent, and clinical characteristics.

Disease group	Causative agent	Host species	Clinical manifestations / lesions resembling pasteurellosis	Main distinguishing features	References
Bacterial respiratory diseases in ruminants	<i>Mannheimia haemolytica</i>	Cattle, sheep, goats	Fibrinopurulent pneumonia, lobular consolidation, and pleuritis	More prominent leukotoxin-mediated damage and severe pulmonary necrosis	Jesse <i>et al.</i> (2019); Onizuka <i>et al.</i> (2024)
Bacterial respiratory diseases in ruminants	<i>Histophilus somni</i>	Cattle	Pneumonia, pleuritis, and septicemia with vascular lesions	Systemic thrombosis and possible meningoencephalitis	O'Toole and Sondgeroth (2016)
Bacterial respiratory diseases in pigs	<i>Actinobacillus pleuropneumoniae</i>	Pigs	Acute necrotic-hemorrhagic pneumonia	Extensive pulmonary hemorrhage and necrosis are dominant lesions	Menzel <i>et al.</i> (2014)
Viral respiratory diseases	BRSV, IBR, and Influenza viruses	Cattle and multiple animal species	Respiratory epithelial damage, dyspnea, and secondary bacterial infection	Primary viral lesions such as epithelial necrosis and emphysema; laboratory testing required for confirmation	Kirchhoff <i>et al.</i> (2014); Wei <i>et al.</i> (2025); Piorunek <i>et al.</i> (2023)
Viral diseases in poultry	Newcastle disease virus	Poultry	Sudden death, respiratory signs, and systemic hemorrhage	Prominent neuro-respiratory involvement and widespread systemic lesions	Geda (2024); Wilson and Ho (2013)
Viral diseases in poultry	Avian influenza virus	Poultry	High mortality, systemic hemorrhage, and decreased production	Broad organ tropism and multifocal hemorrhagic lesions	Geda (2024); Wilson and Ho (2013)
Bacterial respiratory diseases in rabbits	<i>Bordetella bronchiseptica</i>	Rabbits	Chronic rhinitis, sneezing, and snuffles syndrome	Generally milder lesions and often occurs without severe pneumonia	Deeb <i>et al.</i> (1990); El-Deemerdash <i>et al.</i> (2023)
Mixed infections	Bacterial-viral co-infections	Multiple animal species	Overlapping respiratory signs and septicemia	Etiological confirmation requires bacterial isolation, molecular diagnostics, and histopathological examination	Umer and Mezgebu (2023); Tigga <i>et al.</i> (2014)

ated with these three disorders, laboratory confirmation is essential to determining the causal culprit (Wilson and Ho, 2013).

In the meantime, it's important to distinguish pasteurellosis in rabbits from other bacterial diseases like *Bordetella bronchiseptica*, which can similarly result in persistent respiratory symptoms including sneezing and rhinitis (Deeb et al., 1990). Clinical diagnosis in the field is complicated by the frequent co-occurrence of these two illnesses (El-Demerdash et al., 2023).

Because pasteurellosis is an opportunistic disease that frequently manifests as a secondary infection, its differential diagnosis is generally quite extensive (Umer and Mezgebu, 2023). In order to differentiate pasteurellosis from other illnesses with comparable clinical and pathological characteristics, confirmation via bacterial isolation, molecular testing, and histological inspection is essential (Tigga et al., 2014).

Transmission

P. multocida, an opportunistic flora found in animal respiratory tracts and mucous membranes, is directly linked to the direct and indirect pathways of pasteurellosis transmission (Henderson et al., 2010). Direct animal contact is the most frequent method of transmission, especially through respiratory secretions including nasal discharge and bacterial droplets (Wilson and Ho, 2013). Particularly in high-density groups, the germs can be released into the environment and ingested by other susceptible animals when an infected animal coughs or sneezes (Wei et al., 2025).

The epidemiology of pasteurellosis is significantly influenced by indirect transmission in addition to direct transmission (Kubatzy, 2022). Feed, drinking water, cage equipment, and surfaces contaminated with secretions are potential sources of infection because the bacteria can persist in humid settings for a while (Butucel et al., 2022). Inadequate ventilation and poor cleanliness raise the possibility of infectious agents building up in the cage environment, which increases the chance of transmission between individuals (Piorunek et al., 2023).

Transmission may not necessarily result in an immediate clinical illness since pasteurellosis frequently develops as an opportunistic infection brought on by stress and immunosuppression (D'Amico et al., 2022). When the right circumstances are met, seemingly healthy animals can act as carriers, harboring *P. multocida* in their upper respiratory tract without exhibiting any clinical signs, yet they can still spread the germs to other animals (Peng et al., 2022).

Transmission dynamics are also significantly influenced by farm management and environmental conditions (Zhu et al., 2021). Bacterial dis-

charge can be accelerated within a herd by high population density, mobility, harsh weather, and co-infection with respiratory virus agents (Cao et al., 2024). Aerosols and direct touch can spread swiftly in poultry, leading to outbreaks with significant mortality rates (Mwasunda et al., 2022).

Risk factors

Numerous risk variables pertaining to host conditions, the environment, and management approaches have a significant impact on the development of pasteurellosis (Mwanga et al., 2024). Because this illness is typically opportunistic, it depends on both the presence of *P. multocida* and circumstances that let the bacteria to transform from commensal colonizers into invasive pathogens (Storoni et al., 2026). Table 3 summarizes the main risk factors that contribute to pasteurellosis in animals.

Stress, both acute and chronic, is one of the primary risk factors (Wilson and Ho, 2013). Transportation, high density, heavy handling, feed changes, and variations in the temperature and humidity of the surroundings can all cause stress (Farahmand-Azar et al., 2025). These illnesses can weaken the host's immune system, especially the respiratory tract's mucosal immune response, which makes it easier for bacteria to colonize and multiply (Reuben et al., 2021).

The risk of pasteurellosis is also significantly increased by environmental variables (Asaeda et al., 2024). Ammonia buildup from excrement, poor ventilation, and high humidity can harm the respiratory epithelium and interfere with the body's defenses (O'Donoghue et al., 2025). These circumstances foster an atmosphere that encourages the transmission of bacteria through respiratory droplets and aerosols (Piorunek et al., 2023).

Additionally, animals' nutritional state and general health play a significant role in determining their susceptibility to infection (Taubaev et al., 2024). Animals with immunosuppression, micronutrient deficits, or poor nutritional status have weakened immune systems (Wilson and Ho, 2013). Because they can harm the respiratory epithelium and promote *P. multocida* secondary invasion, respiratory viral diseases like influenza, infectious bovine rhinotracheitis (IBR), and bovine respiratory syncytial virus (BRSV) are also significant risk factors (Gaudino et al., 2022).

The risk of disease transmission and dissemination is increased in critical care systems with high population densities (Giordano et al., 2015). Overcrowding raises stress levels and resource rivalry, while close contact between animals promotes droplet transfer (Wilson and Ho, 2013). Additionally, the existence of carrier animals that do not exhibit clinical symptoms offers a difficult-to-control source of infection within the community (Körmöndi et al., 2019).

Table 3. Risk factors associated with the occurrence of pasteurellosis in animals.

Risk factor category	Specific factors	Impact on the host	Role in pathogenesis	References
Stress (management and physiological factors)	Transportation, high stocking density, excessive handling, feed changes, and fluctuations in temperature and humidity	Suppresses immune function, particularly respiratory mucosal immunity	Facilitates colonization and proliferation of <i>Pasteurella multocida</i>	Wilson and Ho (2013); Reuben et al. (2021); Farahmand-Azar et al. (2025)
Environmental factors	Poor ventilation, high humidity, and ammonia accumulation from waste	Damages respiratory epithelium and causes mucosal irritation	Disrupts local defense mechanisms and increases exposure to bacterial aerosols	Asaeda et al. (2024); O'Donoghue et al. (2025); Piorunek et al. (2023)
Health and nutritional status	Malnutrition, micronutrient deficiency, and immunosuppression	Reduces immune competence and host resistance	Decreases the immune system's ability to eliminate bacterial infection	Wilson and Ho (2013); Taubaev et al. (2024)
Concurrent infections	BRSV, IBR, and influenza	Causes respiratory epithelial damage	Promotes secondary invasion and infection by <i>P. multocida</i>	Gaudino et al. (2022)
Population density	Overcrowding in intensive production systems	Increases stress levels and animal-to-animal contact	Accelerates transmission through respiratory droplets and direct contact	Giordano et al. (2015); Wilson and Ho (2013)
Carrier animals	Asymptomatic carrier animals	Serve as hidden sources of infection	Maintain and perpetuate the infection cycle within the population	Körmöndi et al. (2019)
Age-related factors	Young animals and older animals with weakened immunity	Immature or reduced immune response	Increases susceptibility to clinical infection and disease progression	Xu et al. (2025); Abera and Mossie (2023)

Pasteurellosis incidence is also influenced by age, with young animals and those with weakened or undeveloped immune systems being more vulnerable to infection (Xu *et al.*, 2025). Adult animals with chronic illnesses or stress also exhibit a higher risk in certain species (Abera and Mossie, 2023).

Public health importance

The main reason pasteurellosis is important for public health is that it is an opportunistic zoonosis that can spread from animals to people, albeit infections in humans are not common (Hasani *et al.*, 2024). *P. multocida*, the main causal agent, is a natural component of the oral cavity, respiratory system, and gastrointestinal tract of many animals, especially livestock and pets like dogs and cats (Aljameely and Wali, 2019). People who often deal with animals are at a higher risk of contracting the disease since it is typically spread through bites, scratches, or direct contact with the saliva of sick animals (Abreu *et al.*, 2018).

P. multocida infections in humans typically result in localized soft tissue infections, such as cellulitis at the bite or scratch site (Kuwahara and Imanaka, 2026). The symptoms, which include pain, redness, swelling, and occasionally the formation of an abscess, usually manifest quickly within 24 hours of exposure (Piorunek *et al.*, 2023). In more serious situations, the bacteria may penetrate deeper tissues and result in problems including septic arthritis, osteomyelitis, or tenosynovitis (Leonhardt *et al.*, 2021). The infection can develop into potentially fatal sepsis and bacteremia in immunocompromised people (Boadu *et al.*, 2021).

Additionally, through the cattle and food security sectors, pasteurellosis has indirect effects on population health (Mcelwain and Thumbi, 2017). Livestock infections can result in higher mortality, lower output, and large financial losses (Ali *et al.*, 2025a). Particularly in intensive livestock systems, this condition may affect the availability of foods derived from animals as well as the financial security of farmers (Kovács *et al.*, 2025). Thus, within the One Health concept, preventing animal pasteurellosis is likewise essential to preserving food security and general population health (Oslan *et al.*, 2022).

Implementing good hygiene and biosecurity practices, such as wearing protective gear when handling sick animals, treating bite wounds promptly and appropriately, and educating animal owners about the possibility of zoonoses, can reduce the risk of animal-to-human transmission (Bosch *et al.*, 2013). Additionally, preventing sickness in animals by vaccination, maintaining a healthy environment, and lowering stress levels all help lower the chance of exposure to humans (Carpenter *et al.*, 2022).

Economic impact

Because of the high rates of illness and mortality as well as the decreased productivity of infected animals, pasteurellosis has a substantial economic impact on the cattle industry (Dubie *et al.*, 2026). Numerous livestock species, such as cattle, buffalo, goats, sheep, pigs, and poultry, are susceptible to this disease, which can cause extensive and multifaceted losses both directly and indirectly (Ali *et al.*, 2025b).

Animal mortality from the acute and septicemic forms of pasteurellosis is the main cause of the direct economic burden (Jeong *et al.*, 2024). Farmers suffer large financial losses when high-value animals, such as dairy cattle, broiler chickens, or beef cattle, suddenly pass away (Miller *et al.*, 2025). Additionally, higher farm operating costs are a result of treatment expenses, such as the usage of antibiotics, supportive care, and veterinary services (Werid *et al.*, 2026). Sometimes the financial value of the animals spared is less than the expense of containing an outbreak (Getnet *et al.*, 2022).

Reduced productivity is a major cause of losses in addition to mortality (Kebkiba, 2021). Pasteurellosis can result in weight loss, stunted growth, reduced milk production in dairy cattle, and reduced egg production in poultry in productive livestock (Kimeli *et al.*, 2025). This con-

dition has a direct impact on livestock businesses' profitability and production efficiency, particularly in intensive systems where good animal performance is crucial (Taubaev *et al.*, 2024).

The expenses associated with illness prevention and control are another example of indirect economic effects (Smith *et al.*, 2019). Vaccination, enhanced biosecurity, better ventilation systems, higher stocking density, and regular animal health monitoring are additional expenses that farmers must bear (Oslan *et al.*, 2022). Restrictions on animal mobility during epidemics can also affect market stability by upsetting trade chains and livestock distribution (Clemmons *et al.*, 2021).

By lowering the productivity of the entire livestock herd, pasteurellosis has a wider effect on the country's livestock business (Kappes *et al.*, 2023). The economic worth of animal commodities and its derivatives may eventually be impacted by recurrent outbreaks that erode market trust in the quality of livestock products from a region (Mcelwain and Thumbi, 2017).

Vaccination

In intensive livestock systems with a high risk of transmission, vaccination is a crucial tactic in the fight against *P. multocida*-caused pasteurellosis (Tesfaye *et al.*, 2025). Reducing illness incidence, infection severity, and financial losses from mortality and decreased animal productivity are the main objectives of vaccination (Xu *et al.*, 2025).

Inactivated vaccines (killed vaccines) and, occasionally, subunit vaccines or toxoids containing certain antigenic components such as capsular polysaccharide or lipopolysaccharide are the main types of vaccinations used to prevent pasteurellosis (Boyce and Adler, 2001). Because of their great safety and durability, inactivated vaccines are more commonly employed; however, the ensuing immune response frequently necessitates a booster to maintain optimal levels of protection (Mostaan *et al.*, 2020).

A humoral immune response, which is typified by the generation of particular antibodies against *P. multocida*, is stimulated by vaccination (Shaveta *et al.*, 2014). These antibodies help neutralize toxins, opsonize germs, and improve the efficiency of phagocytosis by immune cells like neutrophils and macrophages (Hasnan *et al.*, 2022). Additionally, some vaccinations have the ability to trigger a cellular immune response, which helps prevent intracellular infection and improve long-term survival (Tesfaye *et al.*, 2025).

The immunological condition of the animals, the timing and frequency of vaccination, and the compatibility of the vaccine strain with the field strain all have a significant impact on how effective vaccination is (Ibrahim *et al.*, 2021). To maintain protective antibody levels in the animal population, vaccination programs with booster regimens are typically conducted on a regular basis in high-prevalence areas (Prihandani *et al.*, 2025). To get the best control outcomes, vaccination is frequently coupled with additional management strategies like enhanced biosecurity, stress reduction, and better living settings (Zhang *et al.*, 2025).

Particularly in endemic locations, immunization against chicken cholera or pasteurellosis has become a crucial component of poultry health efforts (Thanasarakulpong *et al.*, 2015). In contrast, immunization often aims to prevent the disease's high-mortality pneumonic and septicemic forms in ruminants and swine (Fegan *et al.*, 2024).

Even while vaccination is a useful control measure, it does not offer complete protection, therefore in situations when there is a strong infection pressure or immunosuppression, vaccinated animals may still get an infection (Guan *et al.*, 2023). Vaccination should therefore be considered a component of an integrated control strategy that includes thorough animal health management (Mostaan *et al.*, 2020).

Treatment

The goals of pasteurellosis treatment are to get rid of the infectious agent, slow the infection's spread, and lower the animals' mortality and

morbidity (Piorunek *et al.*, 2023). Prompt identification and adequate medical intervention are crucial for successful therapy because the disease is typically acute and progressive, especially in the pneumonic and septicemic forms (Moliya *et al.*, 2024).

Antibiotics that are efficient against *P. multocida* are the main treatment for pasteurellosis (Pintér *et al.*, 2025). Depending on the animal type, disease severity, and patterns of antibiotic resistance in the field, commonly utilized antibiotic groups include tetracycline, penicillin, amoxicillin, sulfonamides, enrofloxacin, and florfenicol (Monteiro *et al.*, 2025). Before the findings of sensitivity tests are known, broad-spectrum antibiotics are frequently the first option in acute infections (El-Demerdash *et al.*, 2023). To improve therapy efficacy, these can then be modified in accordance with culture and antibioticogram results (Prasetyo *et al.*, 2024).

However, the increasing global emergence of multidrug-resistant (MDR) *P. multocida* has become a major therapeutic challenge. Many MDR isolates harbor integrative conjugative elements (ICEs), which facilitate the horizontal transfer of antimicrobial resistance genes, including *flor* (florfenicol resistance), *tet(H)* (tetracycline resistance), and *blaROB-1* (β -lactam resistance) (Serna *et al.*, 2025). Consequently, empirical treatment with tetracyclines or penicillins may fail in areas where these resistant strains are prevalent, highlighting the importance of antimicrobial susceptibility testing (AST) before selecting therapeutic agents whenever possible (Barta *et al.*, 2025).

Improving the animal's clinical condition requires not just antibacterial medication but also supportive care (Iorgoni *et al.*, 2026). Dehydration and electrolyte abnormalities require fluid therapy, particularly in cases of severe anorexia or septicemia (Kuwahara and Imanaka, 2026). NSAIDs, or non-steroidal anti-inflammatory medicines, can be used to lower temperature, relieve pain, and manage the excessive inflammatory response that causes tissue damage (Schoos *et al.*, 2019). In certain instances, animals experiencing acute respiratory distress due to pneumonia may also be candidates for oxygen therapy (Yadav, 2022).

The stage of infection at which therapy is started has a significant impact on treatment outcome (Giordano *et al.*, 2015). Because tissue damage is still minimal and the response to antibiotics is stronger in the early stages of illness, the prognosis is typically better (Holm and Tärnvik, 2000). On the other hand, because systemic damage is frequently irreversible, the prognosis in advanced patients with substantial lung injury or septicemia is typically poor even with therapy (Leonhardt *et al.*, 2021).

Pasteurellosis cases in livestock populations require not only individual treatment but also group therapy (metaphylaxis), which entails giving antibiotics to every animal in the group that is at risk in order to stop the disease from spreading (Ichshanova *et al.*, 2025). In intensive livestock systems, this strategy is frequently employed, particularly during outbreaks (Lestari *et al.*, 2025). Nevertheless, metaphylactic antimicrobial use should be implemented judiciously and in accordance with antimicrobial stewardship principles to minimize the selection and dissemination of antimicrobial-resistant *P. multocida* and other respiratory pathogens (Credille *et al.*, 2024).

Control

Because the disease is impacted by intricate interactions between the causal agent, the host, and the environment, pasteurellosis control necessitates an all-encompassing strategy (Wilkie *et al.*, 2012). As a result, control measures concentrate on lowering risk factors that lead to clinical illness in addition to getting rid of *P. multocida* (Li *et al.*, 2025). Biosecurity, husbandry management, immunization, and continuous animal health monitoring are typically combined in effective control measures (Ali *et al.*, 2025b). An integrated control approach combining prevention, early detection, and clinical intervention is presented in Figure 3.

A crucial first step in stopping and managing the development of pasteurellosis is putting biosecurity into practice (Hasnan *et al.*, 2022). These initiatives include separating sick animals, regularly cleaning pens

and equipment, and limiting the introduction of new animals into the community without sufficient health screening (Verzhikovskiy and Nedosekov, 2024). Breaking the chain of bacterial transmission also requires regulating human and vehicle traffic in the agricultural area, managing waste, and disinfecting the pen environment (Sipos-Szabó *et al.*, 2026).

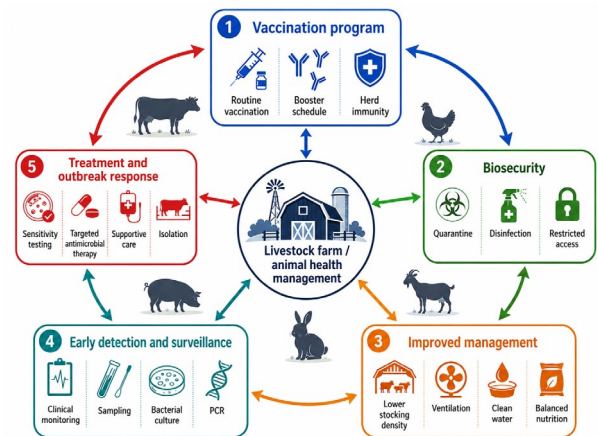


Figure 3. Integrated control strategy for pasteurellosis in veterinary practice.

Another important component in preventing this illness is good husbandry management (Shuka *et al.*, 2022). Stress levels and direct animal contact, which may spread infection, can both be decreased by lowering pen density (Wilkie *et al.*, 2012). Additionally, improving ventilation to lower humidity and ammonia gas buildup promotes respiratory health in animals (Hamilton *et al.*, 1996). A healthy, well-balanced diet and certain nutritional supplements can also strengthen the body's defenses against infection (Imran *et al.*, 2023).

Particularly in endemic regions or intensive livestock systems, vaccination is a crucial preventive measure in lowering the occurrence of pasteurellosis (Xu *et al.*, 2023). When an infection strikes, a well-planned immunization campaign can increase community immunity and lessen the severity of the illness (Domínguez-Odio and Delgado, 2023). However, as vaccination does not offer complete protection against all field strains, it must be combined with other tactics (Li *et al.*, 2025).

In addition, surveillance of antimicrobial resistance should be incorporated into pasteurellosis control programs (Oh *et al.*, 2018). Routine monitoring of resistance profiles and mobile genetic elements, such as ICEs carrying *flor*, *tet(H)*, and *blaROB-1*, can support evidence-based antimicrobial selection and help limit the dissemination of MDR *P. multocida* within livestock populations (El-Tarabili *et al.*, 2025; Jahnen *et al.*, 2025).

Control also requires early discovery and surveillance (Yihunie *et al.*, 2025). Regular cattle health monitoring enables quick case detection, isolation, and treatment before the disease spreads (Abdulkadir *et al.*, 2024). Additionally, to improve the efficacy of field control, farmers must be educated on clinical indicators, risk factors, responsible antimicrobial use, and first management techniques (Holschbach *et al.*, 2019).

Conclusion

P. multocida is the main cause of pasteurellosis, a bacterial infection that affects animal health and the cattle sector globally. Because this illness is opportunistic, predisposing factors like stress, unfavorable environmental circumstances, population density, and the existence of concurrent illnesses have a significant impact on its incidence. Acute septicemia, which can result in unexpected mortality, and respiratory infections are just two of its many clinical presentations.

Numerous bacterial virulence factors that elude the host immune system and cause an excessive inflammatory response that results in significant tissue damage are pathogenetically responsible for successful infection. Pasteurellosis must be diagnosed using a thorough method that combines pathological and clinical findings with test confirmation.

Vaccination, biosecurity, husbandry management, and suitable therapy must all be integrated for its control.

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Conflict of interest

The authors declare that there is no conflict of interest.

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