# RHINITIS: A SHORT REVIEW

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**Abstract.** Rhinitis, defined as inflammation of the nasal mucosa, is a prevalent and multifactorial condition affecting companion animals, particularly dogs and cats. The condition manifests with diverse clinical symptoms, including nasal discharge, sneezing, congestion, and, in chronic cases, reduced olfactory function, significantly impacting animal welfare. The etiology encompasses infectious agents such as viruses (e.g., *canine distemper virus*, *feline herpesvirus*), bacteria (*Bordetella bronchiseptica*, *Pasteurella spp.*), and fungi (*Aspergillus fumigatus*), as well as non-infectious factors like allergies, foreign bodies, and idiopathic lymphoplasmacytic rhinitis. Advanced diagnostic tools, including rhinoscopy, computed tomography (CT), and cytology, have greatly improved the ability to differentiate between infectious, allergic, and neoplastic causes, leading to targeted treatment strategies such as antimicrobial therapy, antifungal agents, and immunosuppressive therapies. Environmental factors, including poor air quality and inadequate husbandry practices, play a critical role in chronic rhinitis, particularly in overcrowded environments. While advances in diagnostics and management have improved clinical outcomes, chronic and idiopathic rhinitis remain significant challenging requiring long-term care. This review synthesizes current knowledge on the etiology, clinical presentation, diagnosis, and management of rhinitis in dogs and cats, emphasizing the importance of a holistic approach to improve animal health and welfare.

**Keywords**: rhinitis, companion animals, fungal rhinitis, idiopathic lymphoplasmacytic rhinitis, computed tomography (ct)

**Abbreviations**
FHV-1: Feline herpesvirus-1
FCV: Feline calicivirus
CT: Computed tomography
B. bronchiseptica: *Bordetella bronchiseptica*
P. spp.: *Pasteurella spp.*

## INTRODUCTION

Rhinitis, defined as the inflammation of the nasal mucosa, is a common yet complex condition affecting a wide range of animal species, particularly companion animals like dogs and cats (Lundgren, 2014; Plumb, 2018). It manifests with diverse clinical symptoms such as sneezing, nasal discharge, congestion, and in chronic cases, reduced olfactory function, which can significantly impact the quality of life and overall well-being of affected animals (Merck & Co., 2021; Aronson, 2004). In veterinary practice, rhinitis holds clinical importance as it can not only cause localized nasal disease but also serve as an indicator of underlying systemic illnesses or environmental challenges (Lappin, 2015; Ter Haar, 2006).

The etiology of rhinitis is multifactorial, making diagnosis and management challenging. Infectious agents, including viruses (e.g., canine distemper virus, feline herpesvirus), bacteria (e.g., *Bordetella bronchiseptica*, *Pasteurella* spp.), and fungi

(*Aspergillus* spp.), are primary causes of both acute and chronic rhinitis (Gaskell & Dawson, 1998; Plumb, 2018). Additionally, non-infectious triggers such as allergies to environmental allergens, foreign bodies, dental disease, and anatomical abnormalities (e.g., brachycephalic syndrome) can exacerbate the condition, further complicating its clinical presentation (Hoffman, 2023; Ter Haar, 2006). In some cases, idiopathic rhinitis or immune-mediated conditions such as lymphoplasmacytic rhinitis have been observed, particularly in canine patients (Aronson, 2004).

Feline rhinitis, often associated with upper respiratory tract infections, is a significant concern in shelters and multi-cat environments where pathogens like feline calicivirus (FCV) and *Chlamydophila felis* can spread rapidly (Lappin, 2015; Gaskell & Dawson, 1998). In dogs, fungal rhinitis caused by *Aspergillus fumigatus* is a prevalent condition, especially in dolichocephalic breeds, and requires advanced diagnostic techniques such as rhinoscopy and imaging for confirmation (Merck & Co., 2021; Ter Haar, 2006).

Rhinitis also highlights important environmental and management concerns in veterinary medicine. Poor air quality, improper husbandry practices, and exposure to allergens or irritants can predispose animals to chronic nasal disease (Lundgren, 2014; Hoffman, 2023). This makes rhinitis not only a diagnostic challenge but also a marker of animal welfare issues, emphasizing the need for a holistic approach in veterinary practice.

Advances in diagnostic tools such as endoscopy, computed tomography (CT), and cytology have enhanced the ability of clinicians to identify the underlying cause of rhinitis and differentiate between infectious, allergic, and neoplastic causes (Plumb, 2018; Lappin, 2015). Treatment strategies, meanwhile, are tailored to address the specific etiology, ranging from antimicrobial therapy for bacterial infections to antifungal agents for mycotic rhinitis and immunomodulatory therapies for allergic or idiopathic rhinitis (Hoffman, 2023).

Given its diverse causes and clinical presentations, rhinitis represents a significant diagnostic and therapeutic challenge in veterinary medicine. A comprehensive understanding of its pathophysiology, along with improved diagnostic capabilities and management strategies, is essential for enhancing patient outcomes. This article synthesizes current research and clinical findings to provide veterinary professionals with a detailed overview of rhinitis in animals, including its types, causes, and implications for animal health and welfare (Ter Haar, 2006; Aronson, 2004). Fungal rhinitis, particularly caused by Aspergillus fumigatus, is a notable condition in dogs, especially in dolichocephalic breeds, where it often presents with unilateral nasal discharge and bone destruction detectable through advanced imaging techniques (Ter Haar, 2006). In cats, chronic rhinitis is frequently linked to persistent infections by feline herpesvirus (FHV-1) and calicivirus, which are especially prevalent in stressful, overcrowded environments like animal shelters (Lappin, 2015). Idiopathic lymphoplasmacytic rhinitis in dogs remains a diagnostic challenge, as it manifests with chronic nasal inflammation without an identifiable underlying cause, necessitating a combination of rhinoscopy, biopsy, and imaging for accurate diagnosis (Aronson, 2004). Environmental factors such as poor air quality, exposure to irritants, and inadequate husbandry practices are also significant contributors to rhinitis, emphasizing the need for preventive care and improved management in veterinary settings (Lundgren, 2014). Fortunately, the advent of advanced diagnostic tools like

computed tomography (CT) and rhinoscopy has markedly enhanced the ability of clinicians to differentiate between infectious, allergic, and neoplastic causes of rhinitis, leading to more targeted treatment approaches (Plumb, 2018).

Bovine rhinitis viruses (BRVs) are emerging pathogens in cattle, contributing to respiratory diseases and significant economic losses in the livestock industry (Zhou et al., 2023). Recent genomic studies on BRV strains circulating in China emphasize the need for continuous surveillance to monitor their genetic diversity and evolutionary trends (Zhou et al., 2023). A novel variant of bovine rhinitis B virus (BRBV) has been implicated as a potential causative agent of bronchitis in goat kids, highlighting a possible cross-species transmission event (Hause & Hause, 2024). Similarly, the prevalence of equine rhinitis viruses (ERVs) among horses in Poland underscores their widespread circulation and the importance of enhanced biosecurity measures in equine management practices (Rola et al., 2024). Phylogenetic analysis of ERV strains in this population revealed significant genetic diversity, demonstrating the dynamic evolution of these viruses within horse populations (Rola et al., 2024).

Table 1. The main causes of rhinitis

| Nr. Crt. | Cause of rhinitis | Description |
|---|---|---|
| 1. | Infectious | Rhinitis in animals can be caused by infectious agents, including viruses such as feline herpesvirus (FHV-1), canine distemper virus (CDV), and influenza viruses. Bacterial infections, like those caused by *Bordetella bronchiseptica* or *Pasteurella multocida*, are also common, often occurring as secondary infections following viral rhinitis. Fungal infections, such as aspergillosis caused by *Aspergillus* species or cryptococcosis due to *Cryptococcus neoformans*, are additional examples. |
| 2. | Allergic | Allergic rhinitis can result from seasonal allergens like pollen or grass, or from non-seasonal triggers such as dust mites, mold, or food allergens. |
| 3. | Environmental or Irritant-Induced | Exposure to environmental irritants, including smoke, chemicals, and air pollutants, can lead to rhinitis. Overexposure to cleaning products, perfumes, or particulate matter like fine dust is another potential cause. |
| 4. | Anatomical or Congenital | Congenital defects such as cleft palate or anatomical conditions like nasal polyps can contribute to rhinitis. Additionally, brachycephalic airway syndrome in short-nosed breeds is a significant factor. |
| 5. | Traumatic or Foreign Body | Rhinitis may occur due to trauma to the nasal passages or the presence of foreign objects, such as grass awns or seeds, which can cause irritation and inflammation. |
| 6. | Neoplastic | Tumors in the nasal cavity, whether benign (e.g., nasal polyps) or malignant (e.g., adenocarcinomas or squamous cell carcinoma), can lead to rhinitis. |
| 7. | Autoimmune and Idiopathic | Autoimmune disorders causing chronic inflammation or idiopathic conditions, such as lymphoplasmacytic rhinitis, are also recognized causes of rhinitis in animals. |

## MATERIALS AND METHODS

### Literature Search Strategy

A comprehensive literature review was conducted to gather relevant studies and data on rhinitis in companion animals, particularly dogs and cats. Scientific databases, including **PubMed**, **ScienceDirect**, and **Google Scholar**, were searched using a combination of keywords such as "rhinitis in dogs," "rhinitis in cats," "feline upper respiratory infections," "canine fungal rhinitis," "lymphoplasmacytic rhinitis," "*Aspergillus fumigatus* in dogs," "feline herpesvirus and rhinitis," and "environmental factors and chronic rhinitis in animals." The search included peer-reviewed journal articles, book chapters, and veterinary clinical guidelines published between **1998–2023**. Articles written in English were prioritized, and reference lists of selected studies were manually screened to identify additional relevant publications.

### Inclusion and Exclusion Criteria

The inclusion criteria focused on studies discussing the clinical presentation, etiology, diagnosis, and management of rhinitis in dogs and cats. Research addressing infectious causes, such as viral, bacterial, and fungal rhinitis, as well as non-infectious causes, including allergic, idiopathic, and anatomical abnormalities, were included. Studies highlighting advanced diagnostic techniques, such as rhinoscopy, computed tomography (CT), and biopsy, were also considered. Articles were excluded if they focused exclusively on species other than companion animals, such as dogs and cats, or if they were abstracts, non-peer-reviewed studies, or not available in English.

### Data Collection and Analysis

The selected literature was systematically reviewed to extract and organize data into key themes. For etiology, the review identified infectious agents such as *canine distemper virus, feline herpesvirus,* and fungi like *Aspergillus spp.*. Bacterial causes included *Bordetella bronchiseptica* and *Pasteurella spp.*. Non-infectious causes, such as allergic rhinitis, brachycephalic syndrome, and idiopathic lymphoplasmacytic rhinitis, were also explored.

The clinical presentation of rhinitis was analyzed based on symptoms such as sneezing, nasal discharge, congestion, and reduced olfactory function. Special emphasis was placed on chronic cases and species-specific manifestations, including fungal rhinitis in dolichocephalic dogs and viral rhinitis in cats housed in shelter environments.

Diagnostic tools, including rhinoscopy, CT imaging, cytology, microbiological cultures, and histopathology, were evaluated. The efficacy and limitations of these techniques were compared to provide insights into their clinical utility. Environmental and management factors, such as poor air quality, allergens, irritants, and inadequate husbandry practices, were explored for their role in predisposing animals to chronic rhinitis.

Therapeutic approaches for rhinitis were reviewed based on the underlying cause. Antimicrobial therapies were discussed for bacterial rhinitis, antifungal agents such as itraconazole were reviewed for mycotic infections, and immunosuppressive therapies like corticosteroids were considered for allergic and idiopathic rhinitis.

**Data Synthesis**

The findings were synthesized to provide a comprehensive understanding of rhinitis in companion animals, with comparisons drawn between canine and feline presentations. The review emphasized the diagnostic challenges posed by overlapping clinical symptoms, the role of environmental factors in chronic rhinitis, and the importance of advanced diagnostic tools in differentiating between infectious, allergic, and neoplastic causes. Species-specific considerations in the diagnosis and treatment of rhinitis were highlighted to improve clinical outcomes and animal welfare.

**Images**

The images used are original images from the database of the Radiology and Medical Imaging service of the Faculty of Veterinary Medicine Cluj-Napoca.

## RESULTS AND DISCUSSIONS

**Etiology of Rhinitis**

The etiology of rhinitis in companion animals is multifactorial, encompassing infectious and non-infectious causes. Infectious agents play a primary role, with viral infections such as canine distemper virus and feline herpesvirus being significant contributors. In cats, viral upper respiratory infections involving feline calicivirus and *Chlamydophila* felis are particularly common in overcrowded environments like shelters. Bacterial infections, including *Bordetella bronchiseptica* and *Pasteurella spp.*, often occur secondary to viral infections or underlying nasal trauma. Fungal rhinitis, primarily caused by *Aspergillus fumigatus*, is a notable condition in dogs, especially in dolichocephalic breeds, where it frequently manifests as chronic unilateral nasal discharge and bone destruction. Non-infectious causes, such as allergic rhinitis, idiopathic lymphoplasmacytic rhinitis, dental disease, and anatomical abnormalities like brachycephalic syndrome, further complicate diagnosis and management (Plumb, 2018)

**Clinical Presentation**

The clinical presentation of rhinitis varies depending on the underlying cause, duration, and species affected. Common symptoms include sneezing, nasal discharge (serous, mucopurulent, or hemorrhagic), nasal congestion, and, in chronic cases, reduced olfactory function. In cats, viral rhinitis often presents with bilateral nasal discharge, ocular discharge, and systemic signs such as lethargy and anorexia. Fungal rhinitis in dogs, on the other hand, tends to cause unilateral nasal discharge and facial pain, often accompanied by radiographic evidence of bone lysis. Chronic idiopathic rhinitis, particularly in dogs, is characterized by persistent nasal inflammation without an identifiable cause, posing significant diagnostic and therapeutic challenges (Plumb, 2018).

**Diagnostic Techniques**

Advanced diagnostic tools have greatly improved the ability to identify the underlying cause of rhinitis. Rhinoscopy remains a cornerstone for direct visualization of the nasal cavity and collection of biopsy samples. Cytology and histopathology of nasal discharge and biopsy specimens are critical for differentiating between

infectious, inflammatory, and neoplastic causes. Microbiological cultures, including bacterial and fungal cultures, aid in identifying causative pathogens such as Aspergillus spp. and Bordetella bronchiseptica. Imaging modalities like computed tomography (CT) provide detailed assessments of nasal structures, revealing bone destruction, soft tissue masses, and foreign bodies (Fig.1). Despite their utility, these techniques may have limitations, such as invasiveness or cost, which can affect their widespread use in clinical practice.

Computed tomography (CT) is a valuable diagnostic tool for assessing rhinitis in animals, providing detailed cross-sectional images of the nasal cavity and sinuses. Dixon et al. (2020) used CT imaging to evaluate osteitis of sinus bony structures in horses with sinonasal disorders, highlighting its effectiveness in identifying bony changes associated with chronic rhinitis. Similarly, Li et al. (2022) demonstrated the utility of CT in diagnosing enzootic nasal tumors in goats, emphasizing its role in detecting space-occupying lesions within the nasal passages. These studies underscore the critical role of CT imaging in diagnosing and managing nasal conditions across various animal species.

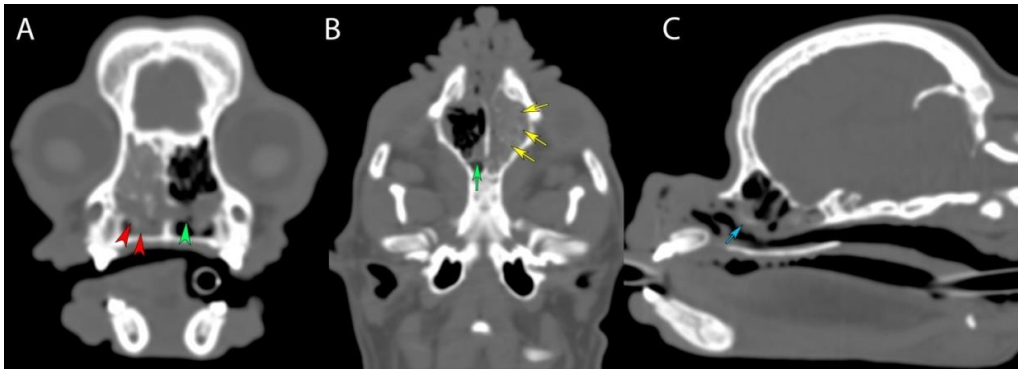


Fig.1. Native CT images of the head in a dog with rhinitis. Original images from the database of the Radiology and Medical Imaging Service, Faculty of Veterinary Medicine, Cluj. A – Axial section: there is a significant soft-tissue opacity occupying the right nasal cavity (red arrowheads) and left nasal cavity (green arrowhead), B – Sagital section: Soft tissue attenuation (yellow arrows) with evidence of underlying poorly destruction affecting the nasal turbinates, suggesting a chronic process and minimal reaction within right nasal cavity (green arrow) and C – coronar section: Soft tissue attenuation at the level of the right nasal cavity (blue arrow)

**Management and Treatment**

The treatment of rhinitis is highly dependent on its underlying cause. Bacterial rhinitis requires targeted antimicrobial therapy based on culture and sensitivity results. Fungal rhinitis, particularly due to *Aspergillus fumigatus*, is managed using systemic antifungal agents such as itraconazole, often in combination with topical therapies. Allergic rhinitis and idiopathic lymphoplasmacytic rhinitis benefit from immunosuppressive therapies, including corticosteroids and antihistamines. Supportive care, such as nasal flushes, humidification, and addressing environmental triggers, plays a crucial role in improving patient outcomes. However, chronic cases of idiopathic rhinitis often require long-term management with variable success rates. The

study by Kaczmar et al., 2018 evaluated the efficacy of three different treatment protocols for canine idiopathic lymphoplasmacytic rhinitis, highlighting that a combination of meloxicam and prednisone offered the most sustained symptom relief. Dogs treated with meloxicam followed by prednisone showed marked clinical improvement and maintained asymptomatic status for six months post-treatment. The findings emphasize the importance of tailored anti-inflammatory therapies for managing chronic inflammatory conditions like lymphoplasmacytic rhinitis in dogs.

Another study by Wang et al., 2024 investigates the nasal mucosal transcriptomes and microbiomes of dogs with chronic idiopathic rhinitis, revealing significant downregulation of genes associated with ciliary function and an upregulation of immune genes related to TNF-α and interferon pathways. Additionally, the nasal microbiome of affected dogs showed an overrepresentation of potential pathobionts, indicating that microbial imbalances may contribute to the pathogenesis of chronic rhinitis.

**Environmental and Welfare Considerations**

According to the University of Florida Shelter Medicine Program (2018), Environmental factors significantly contribute to the development and persistence of rhinitis in companion animals. Poor air quality, exposure to irritants such as smoke or chemicals, and inadequate husbandry practices are common predisposing factors. In shelters and multi-pet households, stress and overcrowding exacerbate the spread of infectious agents, particularly in cats. Addressing these environmental challenges through improved ventilation, stress reduction, and routine veterinary care is essential for preventing and managing chronic rhinitis.

**Future Perspectives**

While significant progress has been made in the diagnosis and management of rhinitis, challenges remain, particularly in chronic and idiopathic cases. Future research should focus on identifying novel diagnostic biomarkers, improving treatment efficacy, and understanding the role of the immune system in chronic rhinitis. Additionally, advancements in imaging technologies and molecular diagnostics hold promise for enhancing clinical outcomes in affected animals.

## CONCLUSIONS

Rhinitis in companion animals is a complex and multifactorial condition with diverse infectious and non-infectious etiologies. While viral and bacterial infections remain significant causes in cats and dogs, fungal rhinitis and idiopathic conditions pose additional diagnostic challenges. Advances in diagnostic tools, including rhinoscopy, computed tomography, and cytology, have greatly improved the ability to differentiate between causes, enabling more targeted treatment strategies. However, chronic and idiopathic rhinitis continue to present therapeutic challenges that require long-term management.

Environmental factors, including poor air quality, allergens, and inadequate husbandry practices, play a critical role in the onset and persistence of rhinitis, particularly in overcrowded or stressful environments. Addressing these factors is essential for improving animal welfare and preventing recurrence.

Future research should focus on enhancing diagnostic capabilities, exploring novel treatment options, and further understanding the immune mechanisms underlying chronic rhinitis. A holistic approach, combining accurate diagnosis, targeted therapy, and environmental management, is essential for improving clinical outcomes and the quality of life of affected animals.

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