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CORIZA INFECCIOSA AVIÁRIA: UMA REVISÃO

AVIAN INFECTIOUS CORYZA: A REVIEW

CORIZA INFECCIOSA AVIAR: UNA REVISIÓN

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Resumo

A coriza infecciosa aviária é uma enfermidade respiratória aguda de galinhas causada pela bactéria

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Avibacterium paragallinarum e representa um importante problema sanitário e econômico para a avicultura. A doença caracteriza-se por sinais clínicos como corrimento nasal, edema facial, conjuntivite, redução do consumo de ração e queda na produção de ovos, podendo ocasionar perdas produtivas significativas. Esta revisão teve como objetivo descrever os principais aspectos relacionados à etiologia, transmissão, virulência, manifestações clínicas, diagnóstico, prevenção, tratamento e práticas tradicionais associadas à coriza infecciosa aviária. Foi realizada uma revisão narrativa da literatura científica, com buscas nas bases SciELO, PubMed, Google Scholar e Portal de Periódicos CAPES, complementadas por literatura especializada sobre doenças aviárias. A literatura indica que a manutenção da bactéria nos plantéis está associada à presença de aves infectadas e portadoras, enquanto a expressão clínica pode ser influenciada pelas condições de manejo, coinfecções e características das cepas circulantes. O diagnóstico deve integrar informações clínicas e epidemiológicas à confirmação laboratorial, especialmente por isolamento bacteriano e métodos moleculares, como a reação em cadeia da polimerase (PCR). A vacinação e a biosseguridade constituem componentes importantes da prevenção, embora as diferenças antigênicas entre os sorovares possam limitar a proteção. O tratamento antimicrobiano pode reduzir os sinais clínicos, mas não necessariamente elimina aves portadoras. Práticas tradicionais envolvendo plantas medicinais são relatadas em sistemas de criação familiar, porém ainda há evidências científicas insuficientes para estabelecer sua eficácia terapêutica contra a coriza infecciosa. Conclui-se que o controle da enfermidade requer uma abordagem integrada envolvendo diagnóstico adequado, biosseguridade, vacinação compatível com o contexto epidemiológico, uso responsável de antimicrobianos e vigilância contínua.

Palavras-chave: *Avibacterium paragallinarum*, avicultura, biosseguridade, sanidade avícola.

Abstract

Avian infectious coryza is an acute respiratory disease of chickens caused by the bacterium *Avibacterium paragallinarum* and represents an important health and economic concern for poultry production. The disease is characterized by clinical signs such as nasal discharge, facial edema, conjunctivitis, reduced feed intake, and decreased egg production, which may result in significant production losses. This review aimed to describe the main aspects of the etiology, transmission, virulence, clinical manifestations, diagnosis, prevention, treatment, and traditional practices associated with avian infectious coryza. A narrative review of the scientific literature was conducted using SciELO, PubMed, Google Scholar, and the CAPES Periodicals Portal, complemented by specialized literature on avian diseases. The available literature indicates that the bacterium is maintained in poultry populations through infected and carrier birds, while disease expression may be influenced by management conditions, coinfections, and characteristics of circulating strains. Diagnosis should integrate clinical and epidemiological information with laboratory confirmation, particularly bacterial isolation and molecular methods such as polymerase chain reaction (PCR). Vaccination and biosecurity are important components of disease prevention, although antigenic differences among serovars may limit protection. Antimicrobial treatment may reduce clinical signs but does not necessarily eliminate carrier birds. Traditional practices involving medicinal plants have been reported in family-based poultry production; however, scientific evidence remains insufficient to establish their therapeutic efficacy specifically against avian infectious coryza. Overall, control of infectious coryza requires an integrated approach involving appropriate diagnosis, biosecurity, vaccination adapted to the epidemiological context, responsible antimicrobial use, and continuous epidemiological surveillance.

Keywords: *Avibacterium paragallinarum*; infectious coryza; poultry health; biosecurity; poultry production.

Resumen

La coriza infecciosa aviar es una enfermedad respiratoria aguda de las gallinas causada por la bacteria *Avibacterium paragallinarum* y representa un importante problema sanitario y económico para la avicultura. La enfermedad se caracteriza por signos clínicos como secreción nasal, edema facial, conjuntivitis, reducción del consumo de alimento y disminución de la producción de huevos, lo que puede ocasionar pérdidas productivas significativas. Esta revisión tuvo como objetivo describir los principales aspectos relacionados con la etiología, transmisión, virulencia, manifestaciones clínicas, diagnóstico, prevención, tratamiento y prácticas tradicionales asociadas a la coriza infecciosa aviar. Se

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realizó una revisión narrativa de la literatura científica mediante búsquedas en SciELO, PubMed, Google Scholar y el Portal de Periódicos CAPES, complementadas con literatura especializada sobre enfermedades aviares. La literatura disponible indica que la bacteria se mantiene en las poblaciones avícolas mediante aves infectadas y portadoras, mientras que la manifestación de la enfermedad puede estar influenciada por las condiciones de manejo, las coinfecciones y las características de las cepas circulantes. El diagnóstico debe integrar la información clínica y epidemiológica con la confirmación de laboratorio, especialmente mediante aislamiento bacteriano y métodos moleculares como la reacción en cadena de la polimerasa (PCR). La vacunación y la bioseguridad constituyen componentes importantes de la prevención, aunque las diferencias antigénicas entre los serovares pueden limitar la protección. El tratamiento antimicrobiano puede reducir los signos clínicos, pero no necesariamente elimina las aves portadoras. Las prácticas tradicionales que involucran plantas medicinales han sido descritas en sistemas de producción familiar; sin embargo, la evidencia científica sigue siendo insuficiente para establecer su eficacia terapéutica específicamente contra la coriza infecciosa aviar. En conjunto, el control de la enfermedad requiere un enfoque integrado que incluya diagnóstico adecuado, bioseguridad, vacunación adaptada al contexto epidemiológico, uso responsable de antimicrobianos y vigilancia epidemiológica continua.

Palabras clave: *Avibacterium paragallinarum*, avicultura, bioseguridad, sanidad avícola.

1. Introduction

Avian infectious coryza is an acute respiratory disease of chickens caused by the bacterium *Avibacterium paragallinarum*. Historically classified within the genus Haemophilus, the organism was subsequently reclassified as A*vibacterium paragallinarum*. The disease primarily affects the upper respiratory tract and is characterized by nasal discharge, facial and infraorbital swelling, conjunctivitis, and respiratory signs. Its economic importance is associated mainly with high morbidity, reduced performance, decreased egg production, and increased costs associated with treatment and control.

According to Blackall (1999), morbidity may be high in affected flocks, whereas mortality is generally low but may increase in association with secondary infections or other predisposing factors. In laying hens, reductions in egg production may occur during outbreaks. The severity of clinical disease is influenced by factors such as the virulence of the infecting strain, immune status, age, management conditions, and the presence of concurrent infections.

Transmission occurs mainly through direct contact with infected birds and through contaminated respiratory secretions and fomites. Indirect transmission may occur through contaminated equipment, personnel, water, and other materials associated with poultry management. Birds that recover from infection may remain carriers and contribute to the persistence of the organism within a flock (Blackall & Soriano-Vargas, 2013; Blackall & Soriano-Vargas, 2020).

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The epidemiology of infectious coryza is therefore closely associated with birds' movement, flock management, biosecurity, and the presence of carrier animals. The disease may occur in birds of different ages, and clinical expression can vary considerably depending on the epidemiological context.

The objective of this review was to critically synthesize evidence regarding the etiology, epidemiology, pathogenesis, diagnosis, prevention, and control of infectious coryza in poultry caused by *A. paragallinarum*, with emphasis on their implications for poultry health and production.

2. Methodology of Review

This study was conducted as a narrative literature review with a structured search aimed at identifying and synthesizing scientific information on the etiology, epidemiology, transmission, clinical manifestations, diagnosis, prevention, treatment, and production-related aspects of avian infectious coryza.

The literature search was conducted in SciELO, PubMed, Google Scholar, and the CAPES Periodicals Portal, complemented by consultation of specialized books, book chapters, and veterinary reference manuals addressing infectious coryza and *Avibacterium paragallinarum*.

The search strategy included descriptors in Portuguese and English related to the disease and its etiological agent, including "avian infectious coryza," "infectious coryza," "*Haemophilus paragallinarum*," "*Avibacterium paragallinarum*," "avian upper respiratory disease," and "transmission of infectious coryza." Boolean operators (AND and OR) were used to combine the search terms when appropriate.

Scientific articles, reviews, books, book chapters, and other specialized technical sources were considered when they addressed relevant epidemiological, clinical, diagnostic, preventive, therapeutic, or production-related aspects of infectious coryza. Duplicate records identified across databases were considered only once.

The review included scientific articles, dissertations, books, and book chapters published between 1990 and 2024 that addressed epidemiological, clinical, diagnostic, or production-related aspects of infectious coryza. Studies presenting inconsistent information, low relevance, absence of primary data, or that did not specifically address

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the disease were excluded. Duplicate materials across databases were considered only once.

The main literature search prioritized publications from the most recent decades, with the search updated through September 2026. Classical studies published before the main search period were also incorporated when they provided relevant historical, taxonomic, experimental, epidemiological, or methodological information that remained pertinent to the interpretation of the disease.

Sources were selected based on their relevance to the objectives of the review, methodological or scientific contribution, and direct relationship with infectious coryza and *A. paragallinarum*. Materials that did not specifically address the disease or its etiological agent were excluded from the evidence synthesis, although selected broader poultry-health sources were retained when necessary to provide contextual information.

3. Results and Discussion

The literature analyzed indicates that avian infectious coryza remains an important respiratory disease of chickens because of its high morbidity, production losses, persistence in affected flocks, and difficulties associated with diagnosis and control. Although *A. paragallinarum* is the etiological agent, the severity of disease may vary according to strain characteristics, coinfections, immune status, environmental conditions, and management practices.

The references identified during the search were organized according to the principal topics addressed in the review. Because individual publications were identified by more than one descriptor, the same study may appear in more than one thematic category. Therefore, the number of citations presented in the tables should not be interpreted as the number of unique studies included in the review.

The descriptors in Portuguese and English used in the literature search were “avian infective coryza”, “*Haemophilus paragallinarum*”, “*Avibacterium paragallinarum*”, “infectious coryza”, “avian upper respiratory disease” and “transmission of infectious coryza”. The studies identified through these descriptors were screened and grouped according to the main topics addressed in the review.

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Because individual publications could be retrieved by more than one descriptor, the same study may appear in more than one thematic category.

The organization of the literature included in this review is presented in Tables 1 and 2. Table 1 summarizes the studies according to the descriptors used in the literature search, whereas Table 2 organizes the references according to the main thematic sections of the review, including etiology, transmission, virulence, clinical signs, diagnosis, prevention, treatment, and traditional knowledge. Complementary studies addressing poultry health and production were also included to support the discussion of applied aspects of infectious coryza.

Table 1. Keywords and sources consulted

Search Keywords	Authors
"*Haemophilus paragallinarum*"	Blackall (1988; 1999); Chen et al. (1996); Terzolo et al. (1993); Yamamoto; Clark (1966)
"*Avibacterium paragallinarum*"	Blackall (1999); Blackall; Soriano (2013); Blackall; Soriano-Vargas (2020); Byarugaba et al. (2007); Deshmukh et al. (2015); El-Gazzar et al. (2025); El-Naenaey (2021); Kuchipudi et al. (2021); Muhammad & Sreedevi (2015); Wang et al. (2014); Sawata et al. (1985); Soriano-Vargas; Terzolo (2004); Mei et al. (2026).
"Infectious coryza"	Blackall (1999); Blackall; Soriano (2013); Blackall; Soriano-Vargas (2020); Deshmukh et al. (2015); El-Gazzar et al. (2025); El-Naenaey (2021); Han et al. (2016); Molino Júnior et al. (2018); Santos et al. (2009); Sawata et al. (1985); Soriano-Vargas; Terzolo (2004)
"Avian upper respiratory disease"	Deshmukh et al. (2015); Han et al. (2016); Santos et al. (2009); Echenique et al. (2020); Deresse et al. (2022)
"Transmission of infectious coryza"	Yamamoto; Clark (1966); Sawata et al. (1985); Soriano-Vargas; Terzolo (2004); Deshmukh et al. (2015)
"Poultry health and production context"	Oliveira et al. (2014); Silva et al. (2003)

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Table 2. Literature Sources by Thematic Section

Tópico	Autores
Etiology	Blackall (1999); Vargas; Terzolo (2004)
Transmission	Blackall; Soriano-Vargas (2013); El-Gazzar et al. (2025); Yamamoto; Clark (1966); Sawata et al. (1985); Vargas; Terzolo (2004)
Virulence	Wang et al. (2014); Blackall (1999); Byarugaba et al. (2007)
Clinical Signs	Blackall; Soriano-Vargas (2020); Vargas; Terzolo (2004)
Diagnosis	Terzolo et al. (1993); Soriano-Vargas; Terzolo (2004); Santos et al. (2009); Kuchipudi et al. (2021); Chen et al. (1996); Muhammad; Sreedevi (2015); Deresse et al. (2022); Mei et al. (2026).
Prevention	Santos et al. (2009); Blackall; Soriano-Vargas (2020); El-Gazzar et al., 2025; Mei et al. (2026).
Treatment	Han et al. (2016); Blackall (1988); Deshmukh et al. (2015); Blackall; Soriano-Vargas (2013); El-Naenaey (2021); Soriano-Vargas (2024).
Traditional Knowledge/ Empirical Practices	Molino Júnior et al. (2018); Oliveira et al. (2014); Silva et al. (2003)

Source: Made by the authors.

3.1. Etiology

Infectious coryza is caused by *A. paragallinarum,* formerly classified as *Haemophilus paragallinarum*. The bacterium has a marked tropism for the upper respiratory tract of chickens. Chickens (*Gallus gallus domesticus*) are the principal natural host and may be susceptible at different ages (Blackall, 1999; Soriano-Vargas & Terzolo, 2004).

The organism has also been detected in other avian species, although the epidemiological relevance and susceptibility of these hosts may vary. Therefore, evidence obtained from experimental infections should be distinguished from evidence of naturally occurring infections.

The pathogenicity of *A. paragallinarum* is associated with several bacterial characteristics, including adhesion to respiratory epithelial cells and mechanisms involved in evasion of host defenses. Hemagglutinins are important in bacterial

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adhesion and have also been associated with antigenic properties relevant to immunity and vaccine development (Wang et al., 2014).

The role of the bacterial capsule in virulence has also been investigated. However, statements relating capsule formation, toxin production, invasiveness, and systemic dissemination should be interpreted cautiously because disease expression depends on both bacterial and host factors.

3.2. Transmission

Transmission of *A. paragallinarum* occurs primarily through contact with infected or carrier birds and exposure to contaminated respiratory secretions. Indirect transmission may occur through contaminated equipment, personnel, water, and other fomites (Blackall & Soriano-Vargas, 2013; Blackall & Soriano-Vargas, 2020).

Recovered birds may remain carriers and consequently represent an important source of infection for susceptible birds. This carrier state contributes to the persistence of the organism within poultry populations and complicates eradication efforts (Blackall & Soriano-Vargas, 2013; Blackall & Soriano-Vargas, 2020).

Experimental studies have demonstrated that the route of exposure and infectious dose influence the establishment and development of infection. The incubation period may vary according to the experimental or field conditions, and therefore a single fixed incubation period should not be applied to all epidemiological situations (Yamamoto & Clark, 1966; Sawata et al., 1985; Soriano-Vargas & Terzolo, 2004).

3.3. Virulence

The virulence of *Avibacterium paragallinarum* is associated with its ability to colonize the upper respiratory tract of chickens. The bacterial capsule has been investigated in relation to colonization and resistance to host defense mechanisms, while hemagglutinating antigens have also been implicated in the interaction of the bacterium with the host (Byarugaba et al., 2007; Wang et al., 2014).

Byarugaba et al. (2007) demonstrated that *A. paragallinarum* isolates obtained from chickens in Uganda were pathogenic to chickens. The authors also observed that the isolates were resistant to the bactericidal activity of normal chicken serum.

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Experimental decapsulation reduced serum resistance, supporting a role for the bacterial capsule in resistance to host defense mechanisms. However, no significant differences in virulence were observed among the Ugandan isolates evaluated.

The relationship between bacterial factors and virulence is therefore complex. Previous studies have reported differences in pathogenicity among isolates and serovars, whereas the findings of Byarugaba et al. (2007) indicate that the isolates evaluated in their study had comparable virulence. Thus, virulence should not be attributed to a single bacterial characteristic, but rather considered in the context of interactions among bacterial properties, host susceptibility, immune responses, and environmental conditions.

3.4. Clinical Signs

The main clinical manifestations of infectious coryza involve the upper respiratory tract. Affected birds may present serous or mucopurulent nasal discharge, facial or infraorbital swelling, conjunctivitis, sneezing, and respiratory difficulty. Facial edema may be unilateral or bilateral.

Reduced feed and water intake may occur as a consequence of respiratory and facial lesions. In laying and breeder flocks, decreases in egg production may also occur. The magnitude of production losses depends on the severity and duration of the outbreak and on the presence of concurrent infections.

In more severe cases, respiratory obstruction may occur as a result of inflammatory exudate and accumulation of caseous material in the upper respiratory tract.

Clinical signs are not pathognomonic for infectious coryza and may overlap with those caused by other respiratory pathogens. Consequently, laboratory confirmation is important, particularly in outbreaks involving multiple pathogens.

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Figure 1. Clinical manifestations of infectious coryza in chickens.



Left: Unilateral facial edema; Right: Bilateral Facial Edema.
Source: Nogueira (2025).

3.5. Diagnosis

Diagnosis of infectious coryza is based on the integration of clinical, epidemiological, and laboratory findings. The main laboratory approaches include bacterial isolation and molecular detection.

Clinical samples are preferably obtained from the upper respiratory tract, particularly from the infraorbital sinus and related lesions. Proper sample collection, storage, and transportation are essential because *A. paragallinarum* is fastidious and may be difficult to recover, especially following antimicrobial treatment or in chronic infections (Terzolo et al., 1993; Soriano-Vargas & Terzolo, 2004).

Bacteriological isolation remains an important reference method because it allows recovery and identification of the etiological agent. However, its sensitivity may be affected by the viability of the organism, sample quality, concomitant microorganisms, previous antimicrobial treatment, and delays in laboratory processing.

Culture may be performed using enriched media appropriate for the growth requirements of the organism, with measures to reduce contamination by other bacteria (Terzolo et al., 1993).

Microscopic examination of clinical material may provide supportive information but should not be considered a definitive diagnostic method because morphological characteristics are not sufficiently specific to confirm infectious coryza.

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Molecular techniques, particularly polymerase chain reaction (PCR), have expanded the diagnostic possibilities for *A. paragallinarum*. PCR can detect the organism directly in clinical samples and may be particularly useful when bacterial isolation is unsuccessful or when rapid confirmation is required (Chen et al., 1996; Muhammad & Sreedevi, 2015; Kuchipudi et al., 2021). However, recent studies have identified non-pathogenic *A. paragallinarum* strains capable of colonizing asymptomatic poultry, indicating that molecular detection of the bacterium does not necessarily correspond to the presence of clinical disease. Specific PCR approaches have therefore been investigated to differentiate pathogenic and non-pathogenic strains, although complete differentiation remains challenging because of the genetic diversity of the species (Mei et al., 2026).

Therefore, PCR should be considered a valuable molecular diagnostic approach, particularly when interpreted in conjunction with clinical and epidemiological findings rather than as an isolated indicator of disease.

Serotyping is relevant primarily to the characterization of isolates and to epidemiological and vaccine-related investigations. It should not be presented as an independent method for confirming the presence of infectious coryza.

3.6. Prevention

The control of infectious coryza is based on the implementation of biosecurity measures, appropriate flock management, and vaccination. Vaccination should be completed before the onset of the laying period, with two doses administered approximately four weeks apart and completed between 10 and 20 weeks of age, according to vaccine characteristics, production system, and epidemiological context. Because cross-protection among serovars A, B, and C of *Avibacterium paragallinarum* is limited, vaccine composition should consider the serovars circulating in the target population. In addition, differences in pathogenicity may occur among strains belonging to the same serovar, indicating that vaccine efficacy is influenced not only by serovar matching but also by the representativeness of the strains used in vaccine formulations (SORIANO-VARGAS, 2024; EL-GAZZAR et al., 2025; MEI et al., 2026).

Birds that recover from infection may remain carriers and contribute to the maintenance and dissemination of *A. paragallinarum* within poultry farms. Therefore,

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the introduction of birds from flocks of unknown sanitary status should be avoided, and replacement birds should preferably originate from monitored or disease-free flocks. All-in/all-out management, adequate cleaning and disinfection of facilities and equipment, and an appropriate downtime period between flocks are important measures for reducing infection pressure and limiting pathogen persistence (BLACKALL; SORIANO-VARGAS, 2020; SORIANO-VARGAS, 2024).

In areas with high infection pressure, vaccination can reduce the occurrence and severity of clinical disease; however, it should not be considered a substitute for biosecurity and sanitary management. Effective control depends on the integration of vaccination with measures aimed at reducing the introduction and circulation of the pathogen within the flock. The selection of vaccines compatible with the serovars circulating in the target population is particularly relevant because of the limited cross-protection among serovars (EL-GAZZAR et al., 2025; SORIANO-VARGAS, 2024).

Therefore, prevention and control of infectious coryza should be based on an integrated approach involving appropriate vaccination programs, acquisition of replacement birds from reliable sources, sanitary management of the premises, cleaning and disinfection, adequate downtime between flocks, and continuous monitoring of flock health status. The specific vaccination schedule should follow the manufacturer's recommendations and be adjusted according to the production system and epidemiological conditions of each farm (SORIANO-VARGAS, 2024; EL-GAZZAR et al., 2025).

3.7. Treatment

Antimicrobial treatment may reduce clinical signs and production losses associated with infectious coryza. However, antimicrobial susceptibility varies among *A. paragallinarum* isolates, and resistance to several commonly used antimicrobials has been reported (BLACKALL, 1988; DESHMUKH et al., 2015).

Studies have shown that field isolates of *A. paragallinarum* exhibit variable antimicrobial susceptibility profiles. Han et al. (2016) evaluated seven field isolates and reported susceptibility to erythromycin, gentamicin, lincomycin, neomycin, oxytetracycline, spectinomycin, and tylosin among the isolates tested. However, susceptibility was lower for enrofloxacin (57.1%), ampicillin (71.4%), cloxacillin

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(85.7%), and sulfamethoxazole-trimethoprim (85.7%), indicating variability in antimicrobial susceptibility among field isolates (HAN et al., 2016). Resistance to streptomycin and other antimicrobials has also been reported in *A. paragallinarum* (BLACKALL, 1988).

Antimicrobial resistance may compromise therapeutic efficacy, while treated or recovered birds may remain carriers and contribute to the persistence and recurrence of infection within the flock (BLACKALL, 1988; BLACKALL; SORIANO-VARGAS, 2013). Therefore, the presence of antimicrobial resistance should be considered when selecting therapeutic approaches for infectious coryza.

Because antimicrobial susceptibility may vary among field isolates, susceptibility testing can assist in selecting appropriate antimicrobial therapy, particularly in persistent or recurrent outbreaks (HAN et al., 2016). Antimicrobial treatment may result in clinical improvement; however, disease may recur after treatment is discontinued, particularly during severe outbreaks (SORIANO-VARGAS, 2024).

Therefore, antimicrobial treatment should be considered an important measure for reducing clinical signs and production losses, but it may not prevent disease recurrence or eliminate carrier birds. For this reason, treatment should be integrated with appropriate biosecurity, flock management, and vaccination strategies. Antimicrobial susceptibility testing may be particularly useful in recurrent or persistent outbreaks and in settings where antimicrobial resistance is documented (HAN et al., 2016; SORIANO-VARGAS, 2024).

The objective of antimicrobial therapy should be to reduce the clinical and production consequences of infection while minimizing inappropriate antimicrobial exposure and the selection of resistant strains.

3.8 Reported Ethnoveterinary Practices

In family-based, free-range, and backyard poultry production systems, bird health management may include empirical practices based on traditional knowledge transmitted among rural producers. These practices may involve the use of locally available plants and other natural resources and represent part of the ethnoveterinary knowledge associated with poultry production (Molino Júnior et al., 2018).

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In the semi-arid region of Alagoas, Brazil, the use of medicinal plants has been reported in traditional practices associated with the management of poultry diseases, including the condition popularly referred to as “gogo” (Molino Júnior et al., 2018). Among the plants reported by poultry producers are lemon, *pinhão-roxo*, angico bark, and the plant popularly known as “cabeça-de-negro.” These resources may be administered through drinking water or mixed with feed according to traditional practices and producers’ practical experience (Molino Júnior et al., 2018).

Garlic has also been investigated as a dietary additive in poultry production. Oliveira et al. (2014) evaluated the inclusion of powdered garlic in broiler diets and observed changes in lymphoid organs, including a reduction in the area of red pulp and in the red-to-white pulp relationship of the spleen. The authors interpreted these findings as evidence of an immunomodulatory effect of garlic. Similarly, Silva et al. (2003) investigated garlic supplementation in laying hens subjected to induced forced molt, assessing production performance and selected organ parameters.

However, these studies did not evaluate therapeutic efficacy against infectious coryza, experimental infection with *Avibacterium paragallinarum*, or antimicrobial activity against the bacterium. Therefore, the traditional use of plants and natural products in poultry health management should be distinguished from experimentally demonstrated therapeutic efficacy. Although such practices may be relevant from an ethnoveterinary and agroecological perspective, there is insufficient scientific evidence to establish their efficacy for the treatment or control of infectious coryza. In particular, studies evaluating garlic in nutritional or immunological contexts should not be interpreted as evidence of clinical, antimicrobial, or therapeutic activity against *A. paragallinarum*.

Further research would be required to determine the safety, appropriate dosage, antimicrobial activity, mechanisms of action, and clinical efficacy of these natural products against *A. paragallinarum* under controlled experimental conditions.

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4. Conclusion

Avian infectious coryza remains an important respiratory disease in poultry production because of its high morbidity, production losses, persistence within affected flocks, and challenges associated with diagnosis and control.

The literature reviewed indicates that *Avibacterium paragallinarum* is maintained in poultry populations through infected and carrier birds and that disease expression is influenced by bacterial characteristics, host susceptibility, coinfections, environmental conditions, and management practices.

Diagnosis should integrate clinical and epidemiological information with laboratory confirmation. Bacterial isolation remains an important reference approach, whereas molecular methods such as PCR provide valuable complementary tools, particularly when conventional isolation is limited by the fastidious nature of the organism or by previous antimicrobial exposure. Serotyping should be regarded primarily as a tool for characterization and epidemiological or vaccine-related investigations rather than as an independent diagnostic confirmation method.

Disease prevention requires an integrated strategy combining biosecurity, appropriate flock management, vaccination programs adapted to the epidemiological context, and continuous monitoring of circulating strains. Antimicrobial treatment may contribute to reducing clinical disease and production losses, but it does not necessarily eliminate carrier birds and should therefore not be considered a standalone strategy.

Traditional knowledge involving medicinal plants is present in some family-based poultry production systems. Nevertheless, the available evidence is insufficient to establish these practices as validated treatments for infectious coryza. Their potential should therefore be investigated through controlled studies addressing efficacy, safety, dosage, and mechanisms of action.

Overall, effective control of infectious coryza depends on the integration of epidemiological surveillance, appropriate diagnosis, biosecurity, vaccination, responsible antimicrobial use, and continued research into the diversity and epidemiology of *A. paragallinarum*.

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Conflicts of interest

The authors declare that there were no conflicts of interest associated with the making of this article.

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