

# AviPod

An Update for Poultry Professionals

VOLUME 3 | ISSUE 4 | 2025

## Ensuring Mycoplasma-Free Poultry Production

### Your Insights, Our Inspiration

Dear Readers,

Mycoplasmosis remains one of the most persistent and economically damaging challenges confronting modern poultry production. Caused primarily by *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS), these infections not only impair respiratory and reproductive health but also compromise overall productivity, creating long-term impacts on profitability and flock sustainability. These pathogens, lacking a cell wall, are highly adaptive and difficult to eliminate once established in a flock and pose a major threat, as it causes increased susceptibility to secondary infections. Their ability to spread both vertically and horizontally, coupled with immune evasion strategies, makes prevention and control exceptionally challenging, particularly in breeder and layer operations where vertical transmission can perpetuate infections across generations.

Effective Mycoplasma control starts with maintaining Mycoplasma-free breeder flocks through strict biosecurity and routine monitoring using serology and molecular tests. Establishing Mycoplasma-free flocks can be possible by preventing Mycoplasma in Day-Old Chicks. Preventing infection in Day-Old Chicks is crucial, as early exposure often leads to lifelong carriers. Early prevention also reduces mortality, production losses and medication costs. Among preventive measures, Tilmicosin, a long-acting macrolide with strong efficacy against MG and MS, has emerged as an effective early control when used judiciously as part of an integrated program to significantly mitigate the burden of Mycoplasmosis in poultry enterprises due to its unique pharmacokinetics and high tissue penetration.

This issue of AviPod explores a comprehensive overview of epidemiology, pathogenesis, clinical and economic impacts as well the latest advances in preventing, diagnosing, and controlling infections for achieving and maintaining Mycoplasma-free flocks. Emphasis is placed on modern diagnostic techniques, vaccination protocols, biosecurity practices, and appropriate antibiotic use within the framework of antimicrobial stewardship.

We trust that this information may contribute to the potential therapeutic approaches for control of Mycoplasma infection and for building healthier, more productive, and Mycoplasma-free flocks. Kindly scan the below QR code to share your valuable experiences, feedback and suggestions or else reach out to us via email at [aviglo@intaspharma.com](mailto:aviglo@intaspharma.com).

We value and await your feedbacks.

Regards

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### Introduction

Mycoplasma infections, primarily caused by *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS), pose significant economic threats to poultry production by affecting respiratory health, reproductive performance and productivity. MG and MS are highly contagious and can be transmitted both horizontally (*via* aerosols, fomites) and vertically (through eggs). The disease manifests as chronic respiratory conditions, reduced feed efficiency, lowered egg production and increased susceptibility to secondary infections. Economic losses are especially severe in breeder and layer operations due to the potential for vertical transmission and long production cycles.

Ensuring Mycoplasma-free status is vital for breeder and layer operations, especially in vertically integrated systems where early infection can perpetuate through flock lineage. To maintain Mycoplasma-free poultry flocks, focus should be placed on preventing infection through strict biosecurity measures, sourcing stock from disease-free breeders, and implementing monitoring program. Understanding the organisms and modern control approaches regarding **biosecurity, diagnostics, vaccination and therapeutic strategies** are critical for ensuring Mycoplasma-free flocks.

### Etiological Agents and their Specificity

Mycoplasmas are mollicutes without a cell wall (surrounded by a cytoplasmic membrane containing lipoproteins) and lacking certain metabolic pathways, both important target features for most of the antibiotics. They attach to epithelial cells of respiratory tract and joint tissues. MG is one of the smallest self-replicating organisms, causing chronic respiratory disease (CRD), while MS is often associated with synovitis and airsacculitis. MG induces respiratory signs and egg production drops, and MS often subclinical but can cause lameness, respiratory issues, decreased egg production and eggshell apex abnormalities under stress or co-infection.

*Mycoplasma* spp. can survive for variable periods outside host, depending on species, moisture, pH, presence of organic material



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and temperature. Some species have been shown to survive for 50 to 150 days at 4°C in liquid media and from 7 to 14 days in dry conditions at 30°C. At 4°C strains of *M. gallisepticum* can survive for 28 days and at 30°C, persist for 14 days. *M. synoviae* is shown to survive for 9 days on synthetic materials. These are important reasons why Mycoplasma is still a major problem in poultry industry. Secondly, antigenic variation and intracellular location of *Mycoplasma* spp. help the pathogen to evade immune system and persist in the host resulting in long-term chronic infection.

### Immune Evasion and Immunosuppression

Strategies of immune evasion by Mycoplasmas are very complex. Antigens of MG exhibit high-frequency changes in size and expression cycle, allowing them to evade the activation of host humoral immune response. MG can invade non-phagocytic chicken cells and also regulate microRNAs to modulate cell proliferation, inflammation and apoptosis in tracheal epithelial cells during disease process. MG has been shown to transiently activate the inflammatory response and then inhibit it by suppressing key inflammatory mediators, avoiding being cleared. The regulation and activation of immune cells are important for host response against Mycoplasma infection. However, MG has been shown to interfere with the functions of macrophages and lymphocytes, compromising their defense capabilities. In addition, it can cause immunological damage to organs by inducing an inflammatory response, cell apoptosis and oxidative stress, leading to immunosuppression in the host. Immune evasion, therefore, presents significant challenges to the control and clearance of the pathogen.

### Epidemiology

- Prevalence of MG and MS in poultry from India and the globe was estimated in a study using meta-analysis from the studies during 2010–2020. Meta-analysis of studies from world showed that overall pooled prevalence estimates for MS [42.52 percent CI (Confidence interval): 33.16–52.16] is more than MG (39.31 percent CI: 25.76–53.74). In India also, pooled estimate for prevalence of MS (29.34 percent CI: 14.40-46.93) is more than MG (25.97 percent CI: 19.41–33.11). South zone has comparatively higher prevalence (37.37 percent) for both MG and MS than other zones in India.
- In another study, prevalence of MS and MG in poultry flocks from different states in India showed 33.00 percent and 11.65 percent positive in samples from live birds and 25.98 percent and 9.45 percent of samples were positive for MS and MG in post mortem examined birds of a single farm. ELISA results showed seroprevalence of 52.10 and 32.60 percent, respectively of MS and MG in a total of 635 samples. The PCR and ELISA results revealed an overall higher prevalence of MS than MG in live birds from different states and in dead birds with CRD.
- In a study at Hisar (India), polymerase chain reaction (PCR) assays, using primers for 16S rRNA gene showed 41.86 percent (36/86), 26.74 percent (23/86) and 12.80 percent (11/86) samples positive for genus Mycoplasma, MG and MS, respectively.
- Overall, studies indicate higher prevalence of Mycoplasmosis worldwide including India and other countries emphasizing the importance of robust surveillance and urgent need for adoption of better control measures including strict biosecurity, vaccination and medication.

### Transmission

MG and MS are transmitted both vertically (through eggs from infected breeders to chicks) and horizontally (via aerosols, hatchery transmission, close contact with infected birds, contaminated equipment, feed and personnel) [Fig. 1]. Infection in flocks on farms is difficult to completely eradicate, often persisting for a long time. Co-infections with pathogens like *E. coli* and respiratory viruses exacerbate disease severity. Wild birds also act as reservoirs, complicating eradication efforts. Rodents act as mechanical vectors. There have been no reports of MG or MS infection in humans.

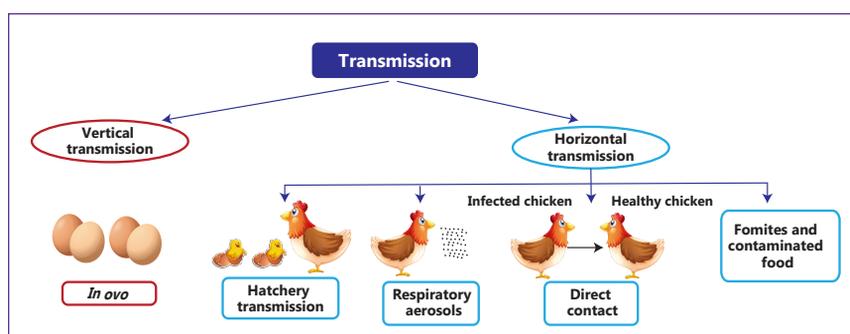


Fig. 1: Modes of transmission of MG and MS

### Economic Impact

Mycoplasma infections can reduce egg production by 10-20 percent, increase feed conversion ratios by 5-10 percent, and cause up to 15 percent mortality in unvaccinated flocks. Estimated global economic losses exceed 780 millions of USD annually. It can reduce weight gain, hatchability and downgrade eggshell quality. Also, increase condemnation of carcass at processing due to airsacculitis.

## Pathogenesis

- Mechanism of *Mycoplasma* infection is summarized as gliding, adhesion and invasion. MG lacks flagella or pili but could form a membrane protrusion composed of bleb and infrableb, allowing it to glide and work cooperatively with adhesin complexes, namely CrmA and GapA. This gliding ability enables them to reach epithelial surfaces and to breach certain physical defenses of the host such as ciliary activity and mucin layer in respiratory tract.
- MG has a high affinity towards chicken respiratory epithelial cells by binding to host cells through adhesins, inducing the expressions of a series of pro-inflammatory cytokines and causing apoptosis or necroptosis in cells. MG hemagglutinin protein pMGA1.2 interacts with cellular protein ApoA-I to establish infection. Also reported that MG synthesizes hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) to initiate lipid peroxidation of host cell membrane, thereby compromising integrity and permeability of cell membrane and facilitating bacterial entry.
- MG adheres to tracheal mucosa, causing damage to ciliated cells. This impairs cell's ability to expel foreign materials and sticky secretions from the trachea, resulting in tracheitis, bronchitis and airsacculitis that affect normal breathing. Once lungs are colonized with MG, it spreads to all organs such as heart, brain, liver, spleen, kidneys and distal limbs as MG invades non-phagocytic chicken cells, such as red blood cells, tracheal epithelium and embryonic fibroblasts.
- MG has acquired a perfect transport system, which benefits from the ability to invade the host's erythrocytes during infection and cross the mucosal barrier to spread systemically. This allows it to settle in tissues at a distance while being protected by the host immune system and then possibly escape by lysing erythrocytes with the help of membrane-bound hemolysin activity. Thus, *Mycoplasma* takes full advantage of host erythrocytes to benefit its survival and spread. In some cases, MG infection is also associated with arthritis, salpingitis, conjunctivitis and fatal encephalopathy. Thus, MG infection could impact multiple organs or tissues, causing considerable economic losses.

## Clinical Manifestations

### • *Mycoplasma gallisepticum* (MG)

MG infection is responsible for chronic respiratory disease (CRD), especially when flocks are stressed or other respiratory pathogens are present. Respiratory signs include nasal discharge, sneezing, coughing, dyspnea, rales, open mouth breathing, conjunctivitis [Fig. 2], anorexia, production fluctuations (i.e. drop in egg production, feed efficiency, weight gains) and increase in mortality. Subclinical infections are common.



Fig. 2: Conjunctivitis

### • *Mycoplasma synoviae* (MS)

Infection with MS may result in a weak clinical expression. Synovitis signs include joint swelling, lameness with tendency to sit. In severely affected birds, hocks [Fig. 3] and footpads are swollen, and sternal bursitis (breast blisters) developed from sternal recumbency. MS also causes decreased egg production and eggshell apex abnormalities (thin-shelled eggs with oil spot at broad end) [Fig. 4] which can affect up to 15 to 20 percent of the production; poor FCR, and growth retardation. Rate of abnormal eggs produced increases when coinfection occurs with infectious bronchitis. In addition, bacterial complications are often observed in contaminated flocks, in particular colibacillosis, which causes peritonitis.



Fig. 3: Swollen hock joint



Fig. 4: Thin-shelled eggs with oil spot at broad end

## Post mortem Findings

- Uncomplicated infections with MS result in mild catarrhal sinusitis, tracheitis and airsacculitis [Fig. 5]. Concurrent infections with *E. coli* result in severe air sac thickening and turbidity, with exudative accumulations, adhesive pericarditis and fibrinous perihepatitis.
- In MS infection, creamy to viscous yellow-grey exudate is present in most synovial structures but most commonly seen in swollen hock [Fig. 6] and wing joints. In chronic cases, exudate may become inspissated.



Fig. 5: Acute airsacculitis with foamy exudates



Fig. 6: Viscous yellow exudate in incised swollen hock

Respiratory lesions may be absent, or consist of mild mucoid tracheitis or sinusitis with airsacculitis when birds are stressed from poor air quality or challenged with Newcastle disease or infectious bronchitis.

## Diagnostic Approaches and Surveillance

Early and accurate detection is crucial for Mycoplasma control. Diagnosis can be made from:

- **Clinical manifestations and post mortem findings:** However, disease is mostly subclinical.
- **Laboratory diagnosis:** Knowledge of status of the herds is necessarily based on laboratory tests. Presence of MG or MS can be confirmed by isolating the organism or by detecting its DNA directly in infected tissues or swab samples by molecular techniques. Serological tests like hemagglutination inhibition (HI), rapid serum agglutination (RSA) and enzyme-linked immunosorbent assay (ELISA) are used, which are rapid and inexpensive, but there is a time lag between the contamination of batch and positivity of tests since they are based on antibody test. Mycoplasma detection tests (culture and PCR) are earlier in detecting positivity of a batch, but are more expensive than serology and require heavier equipment. Regular sampling of tracheal swabs, choanal cleft and air sacs is recommended at Day-old chicks (to check vertical transmission); pre-vaccination and post-vaccination stages; and mid and end-of-lay for layers and breeders. When results are equivocal, birds are usually resampled. Following table [Table 1] summarizes the test methods available for diagnosis of MG, MS with their purposes. Sensitivity of PCR assay is found to be more as compared to isolation of pathogens and other diagnostic techniques.

**Table 1: Test methods for diagnosis of Mycoplasmosis (MG, MS)**

| Method                                      | Purpose                           |  |                                    |                                |                                       |  |
|---|-----------------------------------|--|------------------------------------|--------------------------------|---------------------------------------|--|
|   | Population freedom from infection | Individual bird freedom from infection prior to movement | Contribute to eradication policies | Confirmation of clinical cases | Prevalence of infection -surveillance | Immune status in individual bird or populations post-vaccination |
| <b>Detection of the agent<sup>(a)</sup></b> |                                   |  |                                    |                                |                                       |  |
| Isolation on culture media                  | +(b)                              | -  | +                                  | +                              | -                                     | -  |
| Conventional PCR                            | ++(b)                             | ++(b)  | ++                                 | +++                            | ++                                    | -  |
| Real-time PCR                               | +++ <sup>(b)</sup>                | +++ <sup>(b)</sup>                                       | +++                                | +++                            | +++                                   | -  |
| PCR-DGGE <sup>(c)</sup>                     | +                                 | -  | +                                  | +                              | -                                     | -  |
| <b>Detection of immune response</b>         |                                   |  |                                    |                                |                                       |  |
| HI  | ++ <sup>(d)</sup>                 | -  | +                                  | ++ <sup>(f)</sup>              | ++                                    | +  |
| RSA   | +(e)                              | -  | +                                  | +(f)                           | +                                     | +  |
| ELISA                                       | ++ <sup>(d)</sup>                 | -  | ++                                 | ++ <sup>(f)</sup>              | ++                                    | ++ <sup>(g)</sup>  |

Keys: +++ = Recommended for this purpose; ++ = Recommended but has limitations; + = Suitable in very limited circumstances; – = Not appropriate for this purpose; (a)A combination of agent identification methods applied on the same clinical sample is recommended. (b)Not suitable for day old birds; (c)Applied in culture medium, isolated colonies; (d)Suitable for ensuring lack of infections dating back more than 2–3 weeks; (e)Suitable for ensuring lack of infections dating back more than 5–8 days; (f)Suitable provided paired samples collected a few weeks apart can be analysed; (g)Suitable only for the group vaccinated with killed vaccine, F strain and by temperature sensitive vaccines; PCR: Polymerase chain reaction; DGGE = Denaturing gradient gel electrophoresis

## Control Measures

### A. Biosecurity measures

Preventing Mycoplasma introduction is more cost-effective than treatment. Biosecurity remains the cornerstone of Mycoplasma prevention. Strict biosecurity can reduce Mycoplasma introduction and transmission. Biosecurity may be classified as external and internal.

- **External biosecurity includes - sourcing chicks from Mycoplasma-free breeders**, restricting farm access to only essential personnel, and sanitizing vehicles, equipment and personnel sanitation (change of clothing, hand washing, wearing of masks etc.).
- **Internal biosecurity includes - implementing all-in-all-out production systems**, regular cleaning and disinfection of sheds, proper ventilation, providing dry, clean litter to reduce microbial build-up, and controlling rodent and wild bird. Sanitation and hygienic methods should be followed during artificial insemination of birds to decrease potential vertical transmission.

Biosecurity also includes strict disinfection of eggs, equipment and incubators in hatcheries. Regular air and surface sampling in hatcheries helps catch early contamination. Proper sanitization of chick boxes and vehicles should be followed. Proper and gentle handling during sexing, vaccination and packing also reduces susceptibility to infection.

#### B. Monitoring and surveillance

- Routine serological and molecular monitoring: Breeder flocks should be periodically tested which ensures early detection of MG/MS.
- Flock health auditing and data analysis.

#### C. Environmental control

- **Stress reduction:** Optimal environmental conditions should be maintained to minimize stress on birds, which can weaken immune systems.
- **Dust and ammonia control:** Dust and ammonia levels should be kept low to reduce respiratory irritation and potential spread of infection.

#### D. Vaccination strategies

- Although the preferred method of control is maintenance of MG- and MS-free flocks, both live and inactivated vaccines are used. Vaccination should be considered only in specific cases on the basis of the epidemiological situation in the area or in farms where infection is inevitable. The normal use is to prevent egg-production losses in layers, although vaccines may also be used to reduce egg transmission in breeding stock or to aid MG eradication on multi-age sites. It is important to vaccinate before field challenge occurs.
- Available live vaccines for MG are produced from F strain and strains ts-11 and 6/85. Pullets are generally vaccinated between 9 and 16 weeks of age. One dose is sufficient and vaccinated birds remain permanent carriers. Long-term use of F strain on multi-age sites can result in displacement of field strains. The ts-11 strain has been successfully used to eradicate F strain in multi-age commercial layers. Live MS vaccines are produced from the MS-H strain and MS1. Birds should be vaccinated by 5 weeks of age.
- Inactivated vaccines consisting of concentrated suspension of MG in oil emulsion are also available. They should be administered parenterally to pullets at 12–16 weeks of age. Two doses are desirable. MG bacterins are effective in preventing egg-production losses and respiratory disease, but do not prevent infection with wild-type MG. Inactivated MS vaccine are not commonly used.

#### E. Antimycoplasma therapy

Commonly used therapeutics in antimycoplasma therapy include antibiotics. The lack of cell walls in MG highly reduces the choice of current antibiotics. The aptitude of MG for changing its surface proteins allows the pathogen to reduce efficacy of antimicrobial agents, especially those targeting surface proteins. Although antibiotic treatment cannot be a solution for the eradication of avian Mycoplasmosis, it can be considered a good option to minimize the number of deaths or limit clinical signs. One of the challenges of antibiotic treatments is the development of antimicrobial resistance (AMR) among field isolates. Monitoring the antimicrobial susceptibility profile of field isolates can be a practical way of avoiding AMR. Treatment should be guided by MIC data when available and correct dosing and administration is most important.

##### Antimycoplasma antibiotics include:

- Macrolides (e.g., Tylosin, Tilmicosin, Tylvalosin)
- Tetracyclines
- Pleuromutilins (e.g., Tiamulin)
- Fluoroquinolones (restricted in many regions)

Macrolides are quite effective and recommended as drug of choice against mycoplasma. Macrolides are a group of organic compounds that contain a macrocyclic lactone ring linked glycosidically to one or more sugar moieties. The pharmacokinetics (PK) of macrolides are distinctive due to their large distribution volume and persistence and retention in the lung, and are the preferred treatment, however, resistance is a growing concern. Antibiotic susceptibility surveys showed limited resistance to *M. gallisepticum* and *M. synoviae* for Tilmicosin and Tylosin. In addition to susceptibility, antibiotic needs to reach sufficient concentrations in respiratory tract and preferably also be present intracellularly (as Mycoplasmas are located intracellularly).

Most effective control program is to establish Mycoplasma-free breeder flocks, managed and maintained under good biosecurity to prevent introductions, and monitored regularly with serology/molecular methods to continually confirm infection-free status. **Establishing Mycoplasma-free breeder flocks can be possible by preventing Mycoplasma in Day-Old Chicks.** Prevention in day-old chicks is the best method in controlling the spread and impact of Mycoplasmosis as early infection often results in lifelong carrier status. Early prevention reduces mortality, production loss, medication costs and improves the overall profitability.

Among available interventions for preventing Mycoplasma in Day-Old Chicks, prophylactic approach by administering Tilmicosin (**TILSIN**), a 16-membered semi-synthetic long-acting macrolide antibiotic which is derived from Tylosin and developed for Veterinary use, has emerged as an effective tool for early prevention and control of mycoplasmosis, due to its unique pharmacokinetics, rapid absorption, high tissue penetration, and long-lasting effect. Anti-mycoplasmal activity of Tilmicosin is concentration-dependent and mycoplasmacidal activity is observed at tilmicosin dosage >7.5 mg/kg. As early as 6 hours after oral administration of 75 mg Tilmicosin/L drinking water (equivalent with approximately 15 mg Tilmicosin/kg b.wt./day), the average active substance concentrations detected in lung and airsac were 0.63 µg/g and 0.30 µg/g respectively; 48 hours after the start of treatment, the Tilmicosin concentrations in lung and alveolar tissue were 2.3 µg/g and 3.29 µg/g respectively.

After treatment of broilers with Tilmicosin at the recommended dosage of 75 mg/L drinking water for 03 days, a peak plasma level of 10 µg/ml was reached after 84 hours, while peak concentrations in lung and airsac (2.3 and 3.29 µg/ml respectively) were reached earlier at 48 hours. The latter indicates that Tilmicosin is accumulated well in these tissues.

In a recent pharmacokinetic study [Table 2], after administration of Tilmicosin through drinking water (25 mg/kg), lung revealed high concentrations of Tilmicosin (0.75 ± 0.04 µg/g) up to 14 days after the last dose. Mean plasma concentrations remained above the MIC values of 0.05 µg/ml.

**Table 2: Pharmacokinetic parameters of Tilmicosin after administration through drinking water (25 mg/kg) in broiler chicken**

| Parameters               | Mean ± SD             |
|--------------------------|-----------------------|
| Half life                | 13.24 ± 13.01 hours   |
| C <sub>max</sub>         | 0.25 ± 0.06 µg/ml     |
| T <sub>max</sub>         | 4.25 ± 2.62 hours     |
| Auc <sub>0-t</sub>       | 1.17 ± 0.73 µg.h.ml-1 |
| AUC <sub>0-inf</sub>     | 4.73 ± 3.42 µg.h.ml-1 |
| Relative Bioavailability | 54.94 %               |

AUC<sub>0-t</sub> -Total area under plasma concentration from time zero to the last measurable concentration.

AUC<sub>0-inf</sub> -Total area under plasma concentration from time zero to infinity

T<sub>max</sub> - Time at which C<sub>max</sub> was observed.

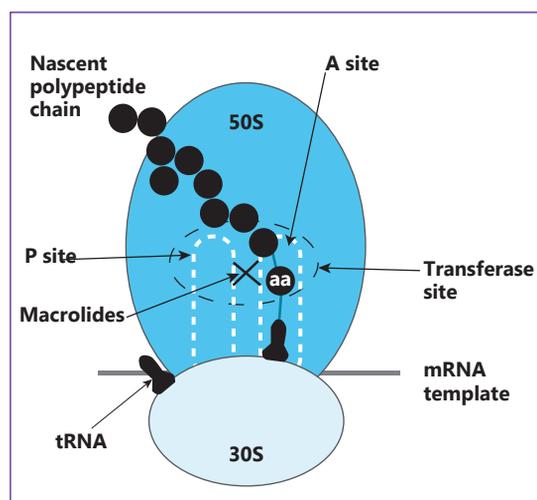
C<sub>max</sub> - The maximum concentration and the corresponding peak time (T<sub>max</sub>)

### Mechanism of action

- Tilmicosin inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit with a specific target in 23S ribosomal RNA molecule and various ribosomal proteins.
- It inhibits the peptidyl transfer reaction.
- The most recent hypothesis suggests that Tilmicosin stimulates dissociation of peptidyl-tRNA from the ribosomes during the elongation phase, leading to inhibition of protein synthesis [Fig. 7].
- Besides, Tilmicosin is having anti-inflammatory effects, potentially reducing inflammatory mediator release.
- Tilmicosin acts synergistically with the birds immune system, enhance phagocyte killing of bacteria.

### Role of Tilmicosin in Mycoplasma control

- Tilmicosin acts primarily against *Mycoplasma* spp. (both MG and MS), a variety of Gram-positive aerobic bacteria, and few Gram-negative bacteria such as *Pasteurella* spp.
- It exhibits high affinity for lung tissues and macrophages, maintaining therapeutic levels up to 7 days post administration. Its long duration and respiratory affinity gives it a superior edge over other antimicrobials for day-old chicks.
- Its intracellular accumulation enables action against intracellular Mycoplasmas (Intracellular concentrations have been shown to be 40 times greater than that of serum).
- Its bacteriostatic effect is enhanced by its prolonged half-life and rapid and extensive tissue penetration in the respiratory tract, especially important for early colonization prevention in chicks.



**Fig. 7: MOA of Tilmicosin**

- It is a drug of choice for treatment and metaphylaxis (i.e. as prophylaxis on newly arrived chicks) of respiratory disease (especially Mycoplasmosis).
- Several *in-vivo* and *in-vitro* studies have confirmed the efficacy of Tilmicosin in controlling MG and MS. Minimum inhibitory concentration (MIC) values are found to be 0.0078 to 0.0156 µg /ml and 0.0625-2 µg/mL for MG and MS respectively.
- Tilmicosin reduces clinical signs and lesions associated with chronic respiratory disease and improves performance parameters.

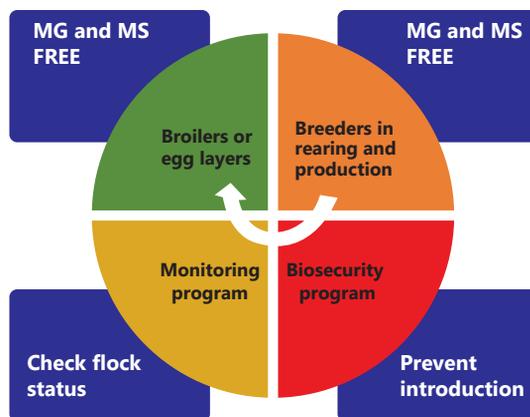
### Recommended dosage and route of administration

- **Breeder, layer and broiler chicks:** Orally, in drinking water at a daily dose of 15-20 mg/kg body weight for 3 days starting on day 1.
- Should be repeated the course on 4<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup> and 16<sup>th</sup> week for breeder and layer chicks, however, last course should not be used in layer chicks within 14 days of the start of the laying period.
- In case of broiler chicks, course should be repeated once during mid grow out period, which should be completed by 12 days before slaughter.

Medicated drinking water should be prepared freshly every 24 hours using only clean water. Only sufficient medicated drinking water should be prepared to cover the daily requirements. The medicated water should be the only source of drinking water for the entire duration of the treatment period. Use of oxidizing sanitizers with Tilmicosin should be avoided.

### Ensuring Mycoplasma-Free Flocks

Fig. 8 shows a production system designed to reduce or eliminate the use of antibiotics that starts by obtaining Mycoplasma-free breeding stock, maintaining flocks free during the rearing and production phases, establishing and implementing biosecurity practices to prevent the introduction, routinely monitoring the status of the flocks, and producing Mycoplasma-free day-old chicks to supply broiler or layer farms.



**Fig. 8:** Production system to reduce or eliminate use of antibiotics by obtaining and maintaining MG and MS free breeder flocks and supplying MG, MS free chicks

**Table 3: Integrative control plan: Tilmicosin in a Mycoplasma-free strategy**

| Stage                 | Action   | Role of Tilmicosin   |
|-----------------------|--|--|
| Hatchery              | Sourcing MG/MS-free chicks                             | N/A  |
| Brooding              | Early surveillance (PCR, ELISA)                        | Pulse medication   |
| Grow-out              | Regular monitoring, biosecurity audits                 | Therapeutic use during outbreaks   |
| Breeder qualification | Serological & molecular confirmation                   | Strategic metaphylaxis where needed  |
| Vaccination           | Administration of live/inactivated vaccines            | Not to use during or near live vaccine periods   |
| Withdrawal            | To ensure compliance with regulatory withdrawal period | 14-day meat withdrawal; not authorised for use in laying hens producing eggs for human consumption |

### Conclusion

Mycoplasmas are lacking a cell wall, highly adaptive and difficult to eliminate once established in a flock and pose a major threat to poultry affecting respiratory health, reproductive performance, productivity and increased susceptibility to secondary infections. Achieving Mycoplasma-free status is critical for maximizing poultry health and profitability. Through a combination of strict biosecurity, advanced diagnostics, targeted vaccination, and strategic antimicrobial use, poultry professionals can significantly mitigate the risks of MG and MS infections.

Prevention in day-old chicks is the best method in controlling the spread and impact of Mycoplasmosis (as early infection often results in lifelong carrier status). Early prevention reduces mortality, production loss, medication costs and improves the overall profitability. Tilmicosin stands out as an effective chemotherapeutic option owing to its pharmacokinetic advantages, tissue distribution, long-lasting effect and efficacy against both *M. gallisepticum* and *M.*

*synoviae*. However, responsible use is vital to preserving its efficacy. By integrating Tilmicosin (**TILSIN**) into a broader Mycoplasma control plan, poultry professionals can significantly enhance flock health, productivity and economic sustainability.

## References

Borthakur, A., Srinivasan, R., Thangamalai, R., Raghavan, G., Sesh, P.S.L. and Tirumurugaan, K.G. (2025). Pharmacokinetics and Chicken Meat Residue of Tilmicosin after Administration Through Drinking Water in Broiler Chicken. *Agric. Sci. Dig.* Online ISSN0976-0547. doi10.18805/ag.D-6192.

WOAH Terrestrial Manual (2021). Chapter 3.3.5. Avian mycoplasmosis (*Mycoplasma gallisepticum*, *M. synoviae*).

Liu, Y.; Wang, Y. and Zheng, S.J. (2024). Immune Evasion of *Mycoplasma gallisepticum*: An Overview. *Int. J. Mol. Sci.* **25**: 2824.

Mugunthan, S.P., Kannan, G., Chandra, H.M. and Paital, B. (2023). Infection, Transmission, Pathogenesis and Vaccine Development against *Mycoplasma gallisepticum*. *Vaccines* **11**: 469.

Ramasamy, K., Edigi, P., Nishitha, Y. and Haunshi, S. (2021). Meta-analysis on the prevalence of Mycoplasmosis in poultry of India and the World. *Res. Sq.* **10**: 21203.

Shakal, M., Qoraa, A. M. and Salem, H. M. (2023). *In vitro* and *in vivo* appraisalment of the potency of different antibiotics against experimental *Mycoplasma gallisepticum* and *Mycoplasma synoviae* infections as well as the effectiveness of Guava (*Psidium guajava L.*) leaves extract against *Mycoplasma gallisepticum* as a natural antibiotic alternative. *J. Adv. Vet. Res.* **14**: 166-174.

Yadav, J.P., Singh, Y., Batra, K., Kumar, R., Mahajan, N.K. and Jindal, N. (2025). Isolation, molecular characterization and phylogenetic analysis of *Mycoplasma gallisepticum* and *Mycoplasma synoviae* strains recovered from commercial broiler chicken flocks affected with respiratory tract infections. *The Microbe* **8**: 100485.

Abdelhakim Elkomy, A., Eltanany, N., Aboubakr, M., Roushdy Mohamed, Z. and Elbadawy, M. (2018). Pharmacokinetics and Tissue Residues of Tilmicosin in Normal and Experimentally Mycoplasma Gallisepticum-Infected Broiler Chickens. *Benha Vet. Med. J.* **34**: 188-205.

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