The rising economic threat of Mycoplasma synoviae in poultry

In the past decade, Mycoplasma synoviae (MS) has gained increasing attention relative to its more prominent counterpart, Mycoplasma gallisepticum (MG).

With egg apex abnormalities caused by MS on the rise, awareness of the importance of MS to the poultry industry and the damage it causes to both commercial layers and breeders is of critical importance.

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While many mycoplasma species are pathogenic to humans and animals, only MG and MS cause significant disease and result in economic losses to chicken and turkey production.

Once infected, birds shed mycoplasma intermittently for the remainder of their lives. MG and MS can be transmitted both vertically in breeders and horizontally, particularly in layers in multi-age farms.

MG has been eradicated from many poultry breeding stocks worldwide. In layers, it is thought to be well controlled in some parts of the world though it remains a problem in other areas such as China, Latin America, and some parts of Asia.

Mycoplasma synoviae (MS)

MS has traditionally been considered of little consequence or to cause joint infections, respiratory and reproductive tract disorders and decreased egg production. Concern around MS has greatly increased with the emergence of Egg Apex abnormalities (EAA).

The most common infection route for MS is via the upper respiratory tract. MS infections facilitate the entry of other respiratory pathogens such as Newcastle disease virus (NDV), Infectious bronchitis virus (IBV) and Ornithobacterium rhinotracheale along with pathogens such as E. coli.

The link with IBV infection is of major importance, making effective MS control a necessity in many flocks.

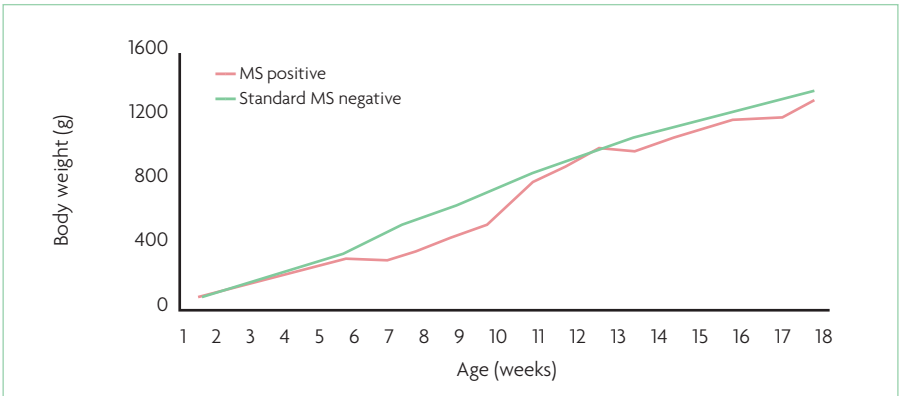


Fig. 1. The effect of an uncontrolled MS infection on the body weight of rearing pullets.

MS can also negatively impact on pullet weights (Fig. 1), causing significant economic loss. When ideal pullet weights are not achieved, peak egg numbers later in life are seldom reached.

As a rule of thumb, pullet flocks should have a 90% body weight uniformity just before transfer to ensure a swift and reliable start to lay.

The MS clinical picture

● MS and E. coli synergism:
Where there is MS and respiratory disease, an association with E. coli is a common problem. This underpins the well-known role of mycoplasma in causing secondary infections.

It is treating these secondary infections that often result in increased antibiotic use in mycoplasma-positive flocks.

In addition to respiratory disease, E. coli secondary to MS can lead to E. coli peritonitis, one of the most important causes of layer mortality globally. In this disease, abundant yolk material is found at the site of inflammation with spreading sepsis often leading to polyserositis and cardiac damage. A typical pattern in layers is a first wave of mortality at peak of lay followed by a second wave from 50 weeks of age until the end of production. The first wave is commonly associated with respiratory infection, while the second wave is often associated with ascending E. coli infection via the reproductive tract.

● MS and joint infections:
Joint infection caused by MS is a common occurrence in breeders and may also be observed in broilers.

Joint pain caused by MS can reduce fertility rates via reduced hatchability when heavier birds become reluctant to mate.

Once MS reaches the joints from the bloodstream, antibiotic treatment can be challenging in this difficult-to-reach part of the body. Early treatment with an effective macrolide such as tylvalosin (Aivlosin), initiated after careful monitoring of MS levels in breeder flocks, has often proven effective. There are several reports of vaccine programmes failing to protect against this manifestation of the disease, especially later in production.

● Eggshell apex abnormality (EAA):
In the last 20 years, EAA caused by MS has spread in breeder and layer production worldwide. Feberwee et al, 2009, demonstrated that EAA is caused by MS. It was first observed and subsequently described in white caged egg layers and has since been reported by the laying industry worldwide.

The likelihood of EAA seems to increase when the primary MS infection descends through the respiratory tract into the reproductive tract and when there are complicating factors, especially IBV infection.

The familiar term 'glass tipped eggs' originates from the appearance of the egg apex when affected by MS-induced EAA,

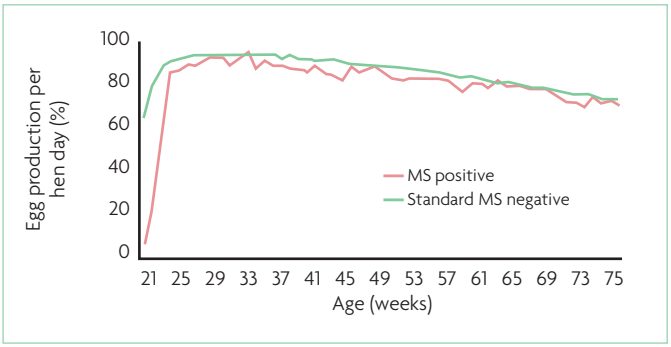


Fig. 2. Egg production data from a MS negative and a MS positive commercial layer flock.

	MS negative	MS positive
Eggs per hen housed	321	300
B-Grade (%)	2.87	3.76
FCR	2.36	2.47
Mortality (%)	5.0	12.6
Point of lay pullet price (£)	3.90	3.90
Price of feed per tonne (£)	210	210

Table 1. Performance data for a MS negative and a MS positive commercial layer flock.

which becomes thin, translucent and very prone to breaking. The egg breakage causes problems when sorting yolk-stained eggs. The example from a French operation (see box) shows how to control losses resulting from EAA.

The economic impact of MS on egg production

In spite of all the worldwide evidence, the economic impact of MS is often underestimated. The data contained in Fig. 2 and Table 1 clearly demonstrate the negative impact that MS has on egg production. In addition to decreased egg numbers, poor health and reduced welfare resulting from MS have a negative economic impact.

As described earlier, joint disease in breeders can reduce fertility and consequently, hatchability.

Reduced egg output and, to a lesser extent, respiratory disease resulting from MS also reduce on-farm profitability significantly. Production losses can be reduced through monitoring, precisely executed vaccine administration and timely treatment with a licensed macrolide such as tylvalosin (Aivlosin).

In several markets, the economic impact of MS appears to be overtaking that of MG. This is especially true in countries where MG has been controlled and, at least in some areas, eradicated. There is a real possibility that MS could replace the niche formerly held by MG, raising the need to consider elimination as a future goal for MS in some parts of the world.

Conclusion

The incidence of MS is increasing in many parts of the world. Research linking MS to EAA has altered previous perceptions and increased awareness of MS throughout the poultry industry, in both layers and breeders.

Aivlosin is a registered trademark of ECO Animal Health Ltd., London, UK. For more information, please consult your advising veterinarian.

The more classical MS presentations still exist, with primary MS and secondary infections causing significant losses to the breeder and commercial layer industries.

MS infections require special attention and are often difficult to manage.

A combination of monitoring, vaccination and careful, as well as timely, treatment often prevents otherwise severe production losses. MS is a fascinating organism with a complex pathogenesis and diverse clinical picture. ■

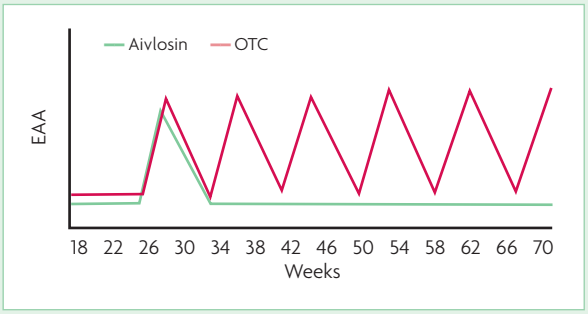
References are available from the author on request

A French example: successful treatment of EAA while comparing two antibiotics

A multi-age commercial layer farm in France had a history of MS causing up to 10% egg losses due to EAA. The farm was situated in a high-density poultry area and had other risk factors as well. Regular on-site monitoring identified the presence of MS and IBV. The company had previously used monthly doses of oxytetracycline, sometimes up to 10 times in one production cycle, initiated when the EAA level rose above 2% in the packaging station. Aivlosin medication was introduced to determine whether it could reduce the number of antibiotic treatments and total antibiotic usage while successfully reducing or eliminating EAA associated with MS.

Two groups were established:
- Oxytetracycline in the feed (400-600ppm for 10 days).
- Aivlosin 625mg/g granules for use in drinking water for chickens and turkeys (25mg/kg BW for three days)

Results demonstrated that:
- Hens medicated with Aivlosin had fewer eggs downgraded due to EAA lesions.
- Hens medicated with Aivlosin required fewer treatments and much less antibiotic mass.
- No further EAA was observed following a single treatment with Aivlosin.



- Number of second grade eggs was reduced by 1% from hens medicated with Aivlosin.
- Medication cost and use was significantly reduced.

In addition, MS susceptibility testing suggested a higher sensitivity to Aivlosin than to oxytetracycline, and to other tested macrolides and one pleuromutilin that might otherwise have been considered suitable for treatment.

This high sensitivity profile for Aivlosin is consistent with other results from Argentina, Mexico, the UK and Spain.

MIC data for a Mycoplasma synoviae strain from the farm for various antimicrobials.

Year	Age (weeks)	Sampled organ	Tylvalosin	Tylosin	Tiamulin	Tetracycline
2015	55	Albumen (egg)	<0.007	0.015	0.125	0.5