

# Decreased production in broiler breeders due to tendon rupture by *Mycoplasma synoviae*

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A finales de febrero de 2013, se produjo un brote de cojeras en un lote de reproductoras pesadas (30.000 aves, en cuatro naves) alojado en una granja de multedad con un total de dos lotes (60.000 aves en total). Las lesiones en las patas comenzaron poco después de la transferencia, entre 22 y 24 semanas de edad, y persistieron durante el resto de la vida del lote, con tasas de producción del lote por debajo del estándar. La necropsia de rutina reveló una serie de lesiones de artritis y sinovitis infecciosas que afectan a la articulación tibio tarsiana en algunas aves y en las almohadillas plantares en otras. El *M. synoviae* se detectó por serología y análisis molecular en los tendones y la tráquea. Tratamiento con fluoroquinolonas en agua de bebida reducía el número de casos pero la morbilidad continuó durante toda la vida del lote influenciando negativamente los datos de producción.

In February 2013, an outbreak of lameness occurred in a broiler breeder flock (30,000 birds divided by four houses) of a multi-age farm, with a total of two broiler breeder flocks (60,000 birds in total). The leg lesions began soon after transfer between 22 and 24 weeks of age, and persisted for the rest of the flock's life, 64 weeks of age. Postmortem examination at the farm revealed arthritis lesions and synovitis affecting the hock joint and the foot pads. *Mycoplasma synoviae* was detected in birds from the affected flock by serologic and molecular techniques. Treatments with fluoroquinolones in drinking water reduce the number of cases but the morbidity continued and affected the standard production rates.

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**Keywords:** broiler breeders; decreased production; *Mycoplasma synoviae*; tendon rupture

## Introduction

In chickens *Mycoplasma synoviae* most frequently occurs as a subclinical or inapparent infection of the upper respiratory tract (Vogl *et al.*, 2008). Nevertheless, this agent can also cause an infectious synovitis (Cobb, 2011). In both cases, infection with *M. synoviae* might result in a decrease of egg production, growth and hatchability rates, and in a downgrading of carcasses at slaughter due to airsacculitis and arthritis lesions (Fiorentin, *et al.*, 2003; Kleven, 2003; Noormohammadi, 2007; Peebles, *et al.*, 2011). In recent years, the occurrence of arthropathic and amyloidogenic strains of *M. synoviae*, as well as strains that induce eggshell apex abnormalities and egg production losses, has increased the economic impact of this pathogen (Catania *et al.*, 2010; Feberwee *et al.*, 2008; Landman and Feberwee, 2008).

**Case Report.** In late February 2013, an outbreak of lameness occurred on a broiler breeder flock (30,000 birds divided by four houses) of a multi-age farm, with a total of two broiler breeder flocks (60,000 birds in total). The leg lesions began soon after transfer between 23 and 25 weeks of age, and persisted for the rest of the flock's life although with peaks of morbidity and mortality. The percentage of birds with this problem ranged between 5 and 10%. A standard breeder vaccination program was applied but the flock had not been vaccinated against *M. gallisepticum* or *M. synoviae*. In the rearing

period, between 10 and 18 weeks of age, serologic tests to *M. gallisepticum* and *M. synoviae* were negative. The other flock present in the same farm was serological controlled to *M. gallisepticum* and *M. synoviae* in the 30, 40, 50 and 59 weeks and all the controls were negative.

## Materials and Methods

*Postmortem examination.* Routine postmortem examination of 30 birds revealed a range of visible joint lesions, typically unilateral in distribution (Figure 1).



**Figure 1- Pathological findings in the foot pad of broiler breeders.**

Postmortem examination of 30 animals at the farm revealed arthritis lesions affecting the hock joint in 40% of the examined birds (Figure 2) and the foot pads in 30%, and 5% of the birds exhibit femoral osteomyelitis. The rest of the examined birds didn't reveal any articular or tendon lesion.



**Figure 2 – Incised swollen hock joint with granulation tissue and purulent exudates.**

After postmortem examination, samples of tendons, trachea and oviduct were collected for bacteriological culture and polymerase chain reaction (PCR) analysis; 40 blood samples were randomly taken from the flock.

The other flock in the same farm was 10 weeks older and, at the time of the outbreak, didn't show any clinical or production signs. For routine control, 40 samples were also randomly taken for comparison.

*Serology.* Blood samples (2 ml per bird) were aseptically collected from the wing veins. Serum samples were tested for antibodies to *M. synoviae*, infectious bronchitis virus (IBV) and Reovirus by an enzyme-linked immunosorbent assay (BioChek© Antibody Test Kit) and *M. gallisepticum* by a rapid serum agglutination test (X-Ovo© *M. gallisepticum*, stained S6 of Adler, U.S.A).

*PCR.* Field samples were randomly collected from broiler breeders not more than 8 h after natural dead and submitted to a commercial laboratory (Controlvet, Tondela, Portugal). Six samples of

tracheae, oviduct and leg tendons were prepared from six different affected birds for PCR to test *M. synoviae*, *M. gallisepticum* and Reovirus.

## Results and Discussion

The alterations seen in tendons are consistent with a *M. synoviae* infection and confirmation was made based on serology and PCR. *Mycoplasma synoviae* was detected in tendons and trachea by PCR. The oviduct samples were PCR negative for all tests. PCR for Reovirus was negative in all samples. *Table 1* summarizes results.

**Table 1. Results of serology (ELISA and rapid serum agglutination) and PCR in broiler breeders with or without tendon rupture.**

Samples	Method	Flock (tendon rupture)	Flock (normal)
Blood	ELISA (MS)	+ (40/40)	- (0/40)
Blood	RSA (MG)	- (0/40)	- (0/40)
Blood	ELISA (IBV)	+ (40/40)	+ (40/40)
Blood	ELISA (Reo)	+ (40/40)	+ (40/40)
Trachea	PCR (MS)	+ (6/6)	ND
Trachea	PCR (MG)	- (0/6)	ND
Tendon	PCR (MS)	+ (6/6)	ND
Tendon	PCR (Reo)	- (0/6)	ND
Oviduct	PCR (MS)	- (0/6)	ND

As a result of these findings, a fluorquinolone was applied in drinking water. After the medication, the number of new cases reduced, however morbidity persist throughout flock life. The production rates were below the standards (*Table 2*).

**Table 2 – Decreased production rates in relation to the standards.**

Egg production	-9,02%
Hatchability	-3,94%
Chicks production	-15,3%
Total mortality	15,3%

Micoplasmas are important avian pathogens, which cause large economic losses in Portugal and worldwide (Kleven, 2008; Stipkovits *et al.*, 2011). Tendon rupture in this flock could be directly

correlated with *M. synoviae* infection. Serologies for IBV and Reovirus were positive and were compatible with the vaccination programs applied. Despite the good level of biosecurity and stringent control of contact routes in Portuguese breeder farms, *M. synoviae* infection was detected. It is not very clear why the other flock didn't appear to have any problem and negative seroconversion till the end of its life even if in near contact with the positive flock. Apart from these results, we can hypothesize the presence of a *M. synoviae* strain with a tendon tropism.

The failure to eradicate *M. synoviae* in commercial poultry flocks is in part due to the ability of this organism to establish lifelong infections in their hosts and due to the physical design of the modern poultry premises (Marois *et al.*, 2005). It is necessary to determine new and more effective strategies to reduce losses due to *Mycoplasma* infections (Kleven, 2003).

In conclusion, infections with *M. synoviae* are present in broiler breeder flocks in Portuguese poultry farms and more investigation should be put into practice to determine prevalence and strategies to reduce economic impact of this pathogen.

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