

**Congenital transmission of *Mycoplasma agalactiae* following a contagious agalactia outbreak in a goat herd from Pernambuco, Brazil**

Transmissão congênita de *Mycoplasma agalactiae* após surto de agalactia contagiosa em rebanho caprino em Pernambuco, Brasil

Huber Rizzo<sup>1\*</sup>, Leandro Lamartine Lopes Rocha<sup>2</sup>, Mayumi Santos Botelho Ono<sup>3</sup>, Flaviana da Silva Dantas<sup>4</sup>, Saulo Romero Felix Gonçalves<sup>4</sup>, Adrienne Mota de Alcântara<sup>2</sup>, Rinaldo Aparecido Mota<sup>1</sup>

**ABSTRACT:** Contagious agalactia, caused by *Mycoplasma agalactiae*, is an endemic disease in dairy goats in Northeastern Brazil, with significant health and economic implications. This case report describes a congenital transmission of *M. agalactiae* in newborns from a dairy goat herd affected by a clinical outbreak in Feira Nova, Pernambuco. Following the introduction of a symptomatic buck, rapid dissemination of the disease was observed, characterized by decreased milk production, mastitis, arthritis, and conjunctivitis. Three newborn kids, born to symptomatic does, exhibited polyarthritis at birth without any clinical or pathological evidence of umbilical infection or postnatal exposure. Molecular testing (PCR) confirmed the presence of *M. agalactiae* in synovial fluid. Necropsies revealed joint degeneration with accumulation of orange serofibrinous fluid and fibrin deposition in the coxofemoral, atlanto-occipital, carpal, and tarsal joints. Serological tests for small ruminant lentiviruses were negative. These findings support the hypothesis of early intrauterine infection and highlight the role of vertical transmission as a complementary route in the epidemiology of caprine mycoplasmosis. The report underscores the importance of early laboratory diagnosis and strict sanitary control, particularly regarding introducing animals into herds and monitoring pregnant goats.

**Keywords:** arthritis; caprine; contagious agalactia; Mollicutes; *Mycoplasma* sp.

**RESUMO:** A agalactia contagiosa, causada por *Mycoplasma agalactiae*, é uma doença endêmica em cabras leiteiras no Nordeste do Brasil, com implicações significativas em saúde e economia. Este relato de caso descreve a transmissão congênita de *M. agalactiae* em recém-nascidos de um rebanho de cabras leiteiras afetado por um surto clínico em Feira Nova, Pernambuco. Após a introdução de um macho sintomático, observou-se rápida disseminação da doença, caracterizada por diminuição da produção de leite, mastite, artrite e conjuntivite. Três cabritos recém-nascidos, filhos de cabras sintomáticas, apresentaram poliartrite ao nascer, sem qualquer evidência clínica ou patológica de infecção umbilical ou exposição pós-natal. Testes moleculares (PCR) confirmaram a presença de *M. agalactiae* no líquido sinovial. As necrópsias revelaram degeneração articular com acúmulo de líquido serofibrinoso alaranjado e deposição de fibrina nas articulações coxofemoral, atlanto-occipital, carpal e tarsal. Os testes sorológicos para lentivírus de pequenos ruminantes foram negativos. Esses achados corroboram a hipótese de infecção intrauterina precoce e destacam o papel da transmissão vertical como via complementar na epidemiologia da micoplasmose caprina. O relatório ressalta a importância do diagnóstico laboratorial precoce e do controle sanitário rigoroso, principalmente no que diz respeito à introdução de animais em rebanhos e ao monitoramento de cabras prenhes.

**Palavras-chave:** artrite; caprino; agalactia contagiosa; Mollicutes; *Mycoplasma* sp.

## INTRODUCTION

Mycoplasma are bacteria found worldwide that cause various diseases in ruminant livestock, such as mastitis, polyarthritis, agalactia, conjunctivitis, pneumonia, and reproductive failure. Mycoplasma diseases constantly affect farm economics through reducing milk production; increasing treatment and diagnosis costs; and causing losses due to animal death, slaughter, and control measures (Jař; Tardy, 2019; Pinheiro; Alves, 2022).

Mycoplasma-related disease is a serious

concern in Northeastern Brazil, where mycoplasma has become endemic since the first outbreak in 2001 in Paraíba (Azevedo *et al.*, 2006; Matos *et al.*, 2019; Santos *et al.*, 2018). Mycoplasma has become a problem because of the lack of producer knowledge about preventive measures, challenges with supervision by health agencies, diagnostic difficulties, and the intense trade of live animals (Pinheiro; Alves, 2022).

Mycoplasmas are generally transmitted through the oral, respiratory, and mammary routes. Replication occurs in the mucosa of the respiratory tract, small intestine, and mammary gland alveoli. The bacteria

<sup>1</sup> Professor, Department of Veterinary Medicine, Federal Rural University of Pernambuco (UFRPE), Recife, PE, Brazil.

<sup>2</sup> Graduate student, Postgraduate Program in Veterinary Medicine, Department of Veterinary Medicine, Federal Rural University of Pernambuco (UFRPE), Recife, PE, Brazil.

<sup>3</sup> Resident, Professional Postgraduate Program in Health Area – Veterinary Medicine, Department of Veterinary Medicine, Federal Rural University of Pernambuco (UFRPE), Recife, PE, Brazil.

<sup>4</sup> Professor, Department of Veterinary Medicine, Federal University of Piauí (UFPI), Bom Jesus, PI, Brazil.

\*Corresponding author:

huber.rizzo@ufrpe.br.

Received: 11/18/2024.

Accepted: 06/12/2025.

spread through the bloodstream to different organs, such as the lungs, lymph nodes, eyes, mammary glands, joints, and tendons (Jaý; Tardy, 2019). Although possible, few reports exist on transplacental infection with *Mycoplasma* spp. in goats (Bar-Moshe; Rapapport, 1981; Filioussis *et al.*, 2011; Silva *et al.*, 2014).

We report the birth of goat kids with polyarthritis due to the congenital transmission of *Mycoplasma agalactiae* in a herd located in Feira Nova, Agreste de Pernambuco, Brazil (latitude 7°57'03" south and longitude 35°23'21" west), given the economic and health importance of mycoplasmosis in goat herds.

## CASE REPORT

Contagious agalactia spread throughout a goat herd in April 2016, following the introduction of a 14-month-old Saanen buck with swelling of the carpal joints and, to a lesser extent, of the tarsal joints (Figure 1A, B). The herd consisted of 46 dairy goats (Saanen, Alpine, and Toggenburg crossbreeds), with the herd members acquired from various goat farmers in the state and raised in a semi-intensive system. The milk production of the females suddenly dropped, and the goats exhibited mastitis, agalactia, arthritis, and keratoconjunctivitis (Figure 1C).

The herd was diagnosed using PCR by the Infectious Diseases Laboratory, Federal Rural University of Pernambuco (UFRPE), Recife, Pernambuco (PE), using a sample of the joint fluid of the 14-month-old Saanen goat, which was cloudy and gelatinous. Five milk samples from symptomatic goats were also examined.

Two pregnant goats with symptoms during the outbreak gave birth at the end of July 2016, about 4 months later, to three male kids, two from a twin birth (Figures 1D and E) and the other from a single birth (Figure 1F), which showed arthritis in the carpal and tarsal joints. The joints were enlarged and soft to the touch, indicating fluid accumulation. Palpation revealed no increase in temperature or tenderness. No evidence of omphalophlebitis was found, and the umbilical cord was cauterized with 10% iodine for 3 days. The goats' serum was tested for small ruminant lentivirus at the Laboratory of Domestic Animal Viruses, UFRPE, Recife, PE, using the agar gel immunodiffusion technique (AGID), following the manufacturer's protocol (Bioveteck®, Recife/PE). The test was read after 48 to 72 h under light on a dark background, and all animals were found to be seronegative.

The goat kids were euthanized. Necropsies were performed at the Pathology Laboratory, UFRPE, Recife, PE, and the results revealed no organ changes, only degeneration of the carpal and tarsal joints in the three male kids. In two other animals, the coxofemoral and atlanto-occipital joints were also affected. The presence of dense orange liquid with fibrin was found in all joints. The results of cultures of the joint material performed at the Laboratory of Bacteriology, UFRPE, showed no growth of any infectious agent. However, the PCR testing of the joint fluid samples was positive for *M. agalactiae*.

## DISCUSSIONS

The mycoplasmosis outbreak in the Feira Nova goat herd demonstrates the risk of disease transmission in Northeastern Brazil, where the movement of animals is intense because of herd replacement and formation

**Figure 1** – Goat herd affected by mycoplasmosis. (A) Goat with arthritis in the carpal joints, (B) goat with low body score, antalgic position in the station (curved back), and (C) arthritis in the left carpus and immobilized right forelimb due to carpal dislocation. (D and E) Goat kids born from twin births with enlarged carpal and tarsal joints and (F) single kids with enlarged carpal.



Source: Own authorship.

by different breeders without examinations and/or proper health reports, as well as the participation in agricultural fairs and exhibitions (Matos *et al.*, 2019; Pinheiro; Alves, 2022). Introducing a symptomatic animal into a herd demonstrates the lack of awareness of the breeders. Mycoplasmosis should be considered in goats with arthritis, because the agent has been identified in goats in Pernambuco and is endemic in northeast Brazil (Azevedo *et al.*, 2006; Matos *et al.*, 2019; Santos *et al.*, 2018).

The congenital transmission of mycoplasmas in ruminants is not yet well understood. The limited monitoring of births and diagnoses, restricted to a few qualified laboratories, may explain the scarcity of reports correlating mycoplasmas with reproductive disorders (Silva *et al.*, 2014). The reported cases in goats were caused by *M. mycoides* subsp. *Mycoides* in two goat kids from twin births in Israel (Filioussis *et al.*, 2011). *M. agalactiae* was found in nine and three goat kids from single births in Greece and Brazil (Paraíba), respectively (Bar-Moshe; Rapapport, 1981; Silva *et al.*, 2014).

Pregnant female goats with mycoplasma infections may abort (Rodriguez; Da Massa; Brooks, 1996), or transmission to kids can occur shortly after birth through the colostrum, leading to septicemia accompanied by arthritis or pneumonia, which has a high mortality rate (Jaý; Tardy, 2019). The goat kids in this case were born with polyarthritis, as in the cases that occurred in Paraíba. The infection likely occurred early in gestation, leading to immunological tolerance due to the development stage of the immune system, which prevented abortion. Parturition occurred approximately 4 months after the outbreak began in the herd (Silva *et al.*, 2014).

Research on *M. bovis* and hemoplasmas in cattle suggests that transplacental transmission is an alternative route of infection, although being less important in the epidemiology of the infection (Maunsell; Donovan, 2009; Ferreira *et al.*, 2024).

However, a syndrome called mycoplasmal pneumoarthrititis has been reported in Hungary, diagnosed in calves, causing losses. Mycoplasmal pneumoarthrititis originates from intrauterine infection with *M. bovis*, causing polyarthrititis, occasionally accompanied by meningitis, with severe symptoms within the first days after birth: a high body temperature (40 to 41°C) and joint deformities hindering breastfeeding, leading to emaciation and death at 1 to 3 weeks of age (Stipkovits; Rády; Glávits, 1993).

Treatment was not administered at the discretion of this owner in our case, and the animals were referred for euthanasia as a disease control measure. In contrast, Filioussis *et al.* (2011) successfully treated nine goats with polyarthrititis and joint fluid containing a high number of degenerated neutrophils. However, this clinical course can lead to an asymptomatic chronic carrier being maintained in the herd, as the antibodies in goats can be found for up to eight years following the manifestation of clinical disease in the herd (Gómez-Martín *et al.*, 2013; Jaý; Tardy, 2019).

The necropsy findings in this case report are similar to those described by Bar-Moshe and Rapaport (1981); however, the findings differed in the joint content, which was purulent, possibly because of different species of mycoplasma affecting these cases. The joint fluid appearance was more similar to that in cases caused by *M. bovis* in calves, where serofibrinous polyarthrititis was observed. Serofibrinous polyarthrititis is characterized by joints containing large volumes of clear-to-straw-brown synovial fluid containing white, thick, and confluent fibrin films (Stipkovits; Rády; Glávits, 1993). The results of joint punctures of goat kids born with polyarthrititis in Paraíba showed transparent fluid in one kid and a yellowish fibrinopurulent fluid in another (Silva *et al.*, 2014).

The birth of congenitally infected kids, with or without symptoms, contributes to disease persistence in herds, in addition to milk, which can carry mycoplasma for 12 months to 8 years in goats, with very mild or no clinical signs (Jaý; Tardy, 2019).

## CONCLUSIONS

Identifying *M. agalactiae* in goat kids with polyarthrititis confirms congenital transmission during a contagious agalactia outbreak. This finding reinforces the clinical and epidemiological relevance of the vertical route as a mechanism for the persistence of mycoplasmosis within herds. Neonatal surveillance and monitoring of pregnant goats, combined with strict biosecurity measures, are essential to prevent losses and contain disease spread, especially in endemic regions.

## REFERENCES

- AZEVEDO, E. O. *et al.* Contagious agalactia by *Mycoplasma agalactiae* in small ruminants in Brazil: first report. **Brazilian Journal of Microbiology**, v. 37, p. 576-581, 2006.
- BAR-MOSHE, B; RAPAPPORT, E. Observations on *Mycoplasma mycoides* subsp. *mycoides* infection in Saanen goats. **Israel Journal of Medical Sciences**, v. 17, p. 537-539, 1981.
- FERREIRA, F. S. *et al.* Apparent prevalence of transplacental transmission of hemotropic mycoplasmas in Holstein dairy calves. **JDS Communications**, v. 7, p. 1-5, 2024.
- FILIOUSSIS, G. *et al.* Congenital polyarthrititis in goat kids attributed to *Mycoplasma agalactiae*. **The Veterinary Record**, v. 169, p. 14, 2011.
- GÓMEZ-MARTÍN, A. *et al.* Contagious agalactia due to *Mycoplasma* spp. in small dairy ruminants: epidemiology and prospects for diagnosis and control. **The Veterinary Journal**, v. 198, n. 1, p. 48-56, 2013.
- JAY, M.; TARDY, F. Contagious agalactia in sheep and goats: current perspectives. **Veterinary Medicine: Research and Reports**, v. 10, p. 229-247, 2019.
- MATOS, R. A. T. *et al.* Occurrence and risk factors associated with *Mycoplasma agalactiae* infection in dairy goat herds of Paraíba State, Brazil. **Pesquisa Veterinária Brasileira**, v. 39, n. 2, p. 93-98, 2019.
- MAUNSELL, F. P.; DONOVAN, G. A. *Mycoplasma bovis* infections in young calves. **Veterinary Clinics of North America: Food Animal Practice**, v. 25, n. 1, p. 139-177, 2009.
- PINHEIRO, R. R.; ALVES, F. S. F. **Nota Técnica Micoplasmose de Pequenos Ruminantes no Brasil: Relatos de pesquisas**. Sobral: Embrapa Caprinos e Ovinos, 2022. 21p.
- RODRIGUEZ, J. L.; DA MASSA, A. J.; BROOKS, D. L. Caprine abortion following exposure to *Mycoplasma capricolum* subsp. *Capricolum*. **Journal of Veterinary Diagnostic Investigation**, v. 8, p. 492-494, 1996.
- SANTOS, S. B. *et al.* Epidemiologia de *Mycoplasma agalactiae* e *Mycoplasma mycoides* cluster em rebanhos do nordeste do Brasil. **Ciência Rural**, v. 48, n.4, e20170427, 2018.
- SILVA, N. S. *et al.* Infecção congênita em cabritos por *Mycoplasma agalactiae*. **Arquivos Brasileiro de Medicina Veterinária e Zootecnia**, v. 66, n. 2, p. 631-634, 2014.
- STIPKOVITS, L.; RÁDY, M.; GLÁVITS, R. Mycoplasmal arthritis and meningitis in calves. **Acta Veterinaria Hungarica**, v. 41, n. 1-2, p. 73-88, 1993.