



Identification of behavioral pattern associated with mastitis in dairy cows

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Mastitis is considered as the most frequent and costly disease in dairy cows

is a multifactorial disease characterized by an inflammatory response of the udder tissue caused by physical trauma or **microorganism infections**

can be classified as sub-clinical or clinical mastitis based on the degree of inflammation and as contagious and environmental mastitis based on the causal pathogen

Degree of inflammation

Sub-clinical mastitis

- Decreased milk production
- Increased SCC in milk
- No visible abnormalities in the udder or milk

Clinical mastitis

- Decreased milk protein, fat, and lactose contents
- Changes in milk consistency (watery milk with flakes and clots)
- Inflammation of the udder

(swelling, heat, redness and pain)

- Fever
- Loss of appetite





Garcia (2004)

Shuster et al. (1991)

Cheng & Han (2020)







Context



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is a painful disease during which dairy cows express a sickness behaviour

Alteration in activity patterns because of the pain caused by the swollen udder

Increased	Decreased
Time spent standing Idle standing time	Time spent lying down especially on the side of the inflamed udder quarter
Stepping	Time spent eating
Restless during milking	Time spent ruminating
Hock-to-hock distance when standing	Self-grooming



Mainau et al. (2022) ; Fogsgaard et al (2012) ; Siivonen et al (2011)

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Mastitis is a major health and welfare issue in dairy cows











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Berteselli et al. (EAAP 2022) Sepúlveda-Varas et al. (2016) Antanaitis et al. (2022)













<u>Weeks or months before diagnosis</u> :

Do cows that will subsequently suffer from mastitis express distinctive behavioural patterns ?

As it was previously showed for acidosis

Less time standing and more time lying, walking and eating Differences in time spent ruminating Differences in the evolution of time-budget over time before acidosis

Herve et al. (2023), ICAR conference

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Could these behavioral patterns be considered as a risk factor for the disease ?

Patbandha et al (2016)

Dairy cows that refuse to use the cubicles for resting

Kjæstad & Simensen (2001)

Dairy cows that lie down within 40 min following milking DeVries et al (2012)

Objective and Hypothesis

To compare the **time-budget** of dairy cows that will develop mastitis and dairy cows that stay healthy throughout lactation weeks or months before the onset of mastitis

Time spent walking

Time spent standing

Time spent lying down

Time spent ruminating

HYPOTHESIS = Dairy cows that will subsequently develop mastitis, express early distinctive behavioural patterns associated with the disease compared to healthy cows



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Material and methods

Data acquired from January 2021 to October 2022

Two free stall commercial conventional farms located in Lombardy, Italy

Holstein Fresian dairy cows



Equipped with precision livestock farming (PLF) technologies to monitor animal activities at the individual level

Accelorometry collars

(Ida collars, Connecterra)

n = 155 and n = 82



Material and methods



Dataset : Individual data related to





Material and methods



Group constitution :

MASTITIS GROUP

(n = 16) Cows suffering from one mastitis during lactation

Time window : from calving to 15d prior mastitis

Statistical analyses :

- Modelling of the individual evolution of the time per day spent doing each behaviour relative to the day before mastitis
- Group effect (Mastitis vs. Control) on the intercept and the slope of the regression curve analysed by ANOVA

CONTROL GROUP (n = 16) Cows that stay healthy during the entire lactation

Balanced for parity and lactation stage Same time-window as for Mastitis group



Effect of the group on the intercept of the regression curve

Time dedicated to each behaviour in cows that will subsequently develop mastitis and cows that stay healthy during the entire lactation 100 days before mastitis (h/d)



	Gro		
Behaviour	Mastitis	Control	P-value
Standing	12.02	11.97	0.37
Lying	9.25	9.66	< 0.001
Walking	2.69	2.40	< 0.001
Ruminatin	8.56	8.14	< 0.001
g			
Eating	4.81	4.89	0.05



Cows from the Mastitis group spent less time lying and eating 100 days before the onset of mastitis compared to Control cows





Effect of the group on the intercept of the regression curve

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The time-budget of cows from the Mastitis and Control groups differed months before the onset of mastitis



Results



Effect of the group on the slope of the regression curve



The trend in the time spent lying, walking and ruminating over time prior mastitis differed between groups → Lower slope coefficients for the cows from the Mastitis group compared to Control group



The evolution of the time-budget prior mastitis of cows from the Mastitis and Control groups differed



Discussion, conclusions and perspectives



- Dairy cows that will subsequently suffer from mastitis during lactation might expressed different time-budget already few months prior to the onset of the disease



Less time lying

Less time eating



More time ruminating



- Differences in the evolution of the time-budget over time before mastitis
- Expectations : an increased lying time and decreased standing time for cows from the Mastitis group

Time spent lvina down

Time spent standing

- Higher risk of environmental mastitis related to udder soiling with urine and faeces and in turn contamination with bacteria
- Expanding the sample size - Identifying the type of pathogens

may allow to explore better the potentiality of specific behavioural patterns in the time-budget as risk factor / promoters of mastitis.



Discussion, conclusions and perspectives



Evolution of behavioural patterns/time-budget over time relative to the onset of mastitis



Weeks or months before diagnosis

Implications :

Behavioural patterns associated with mastitis



Predicting which cows will develop mastitis based on their behaviour long-term before it happens



Adapting breeding practices to reduce the risk for these cows

Genetic selection



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Thank you for your attention!

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