# *Prototheca spp.* National Report – Czech Republic

*Ing. Růžena Seydlová*

## Introduction

This national report was prepared within the international project team MILKCHECK and focuses on the issue of the occurrence of the algae *Prototheca spp*. in the conditions of the Czech Republic.

The aim of the report is to provide a comprehensive overview of the current state of knowledge in this area, especially in terms of the occurrence of the pathogen, available data, research activities and practical experience from dairy farming. The report also includes an overview of the institutional provision of the issue and a brief assessment of the legislative framework.

The report is based on data obtained within research projects, especially the QK1910092 project, as well as on professional publications and on practical experience from veterinary practice and monitoring of the occurrence *of Prototheca spp*. in pool and individual milk samples.

*Prototheca spp*. is an important non-bacterial pathogen causing cattle mastitis, which can have an impact on animal health and milk quality. Although this is an issue of increasing importance, it is currently not systematically monitored or legislated in the Czech Republic.

The aim of this report is therefore not only to summarise the available knowledge, but also to contribute to a better understanding of this issue and to provide a basis for further discussion at the national and international level.

## 1. National legislation

The issue of the occurrence of *Prototheca spp*. in the Czech Republic is currently not regulated by specific legislation or systematically monitored within the framework of official control mechanisms.

The available information shows that this pathogen is not included among the microorganisms monitored in the milk quality assessment, and no limits are set for it, neither when milk is purchased by dairies nor when milk is sold directly from the yard from private farmers, who do not supply milk for processing to the dairy, but finalize it themselves.

This fact is also reflected in practice, where the incidence is not centrally recorded and the solution of individual cases is left primarily to the level of breeders, veterinary workplaces and research institutions in connection with counselling. It is the duty of every dairy farm to hand over a pool sample of milk for microbiological analysis to the State Veterinary

Institute once a year, where individual mastitis pathogens are identified, but the mentioned *Prototheca spp*. is not in the set of detected ones.

The absence of legislative anchoring may be one of the reasons why the issue of protothecal infections is not systematically reflected in wider veterinary practice, despite its growing importance.

## 2. Institutions and control bodies

The issue of the occurrence of *Prototheca spp*. in the Czech Republic is not addressed as a separately monitored area within the official monitoring. However, the available information shows that it is mainly professional and research institutions that are involved in diagnostics, research and partly control.

**The State Veterinary Institute in Jihlava,** which participates in the examination of milk samples and has been involved in the depistasis of *Prototheca spp.* in pool samples for a long time, plays a key role in the field of diagnostics.

Another important workplace is the **Research Institute of Veterinary Medicine in Brno**, which cooperates on the identification and quantification of non-bacterial mastitis pathogens and participates in research activities in this area.

In the field of applied research and the design of practical solutions, the **Dairy Research Institute in Prague** is also applied, which has developed a certified methodology focused on the eradication of *Prototheca spp*. in farms based on long-term experience in solving the problem in positive farms.

**The State Veterinary Administration** of the Czech Republic has an important role in the approval of methodological procedures, which approved this methodology in 2023.

At the same time, it is clear that due to the absence of specific legislation, the issue of *Prototheca spp*. is not systematically monitored within the control mechanisms focused on milk quality. In practice, the solution of the occurrence of this pathogen is left primarily at the level of individual farms and professional workplaces.

## 3. Occurrence and statistics

The occurrence of these environmental mastitis shows a seasonal character with a peak in the summer months and periods of high environmental humidity, but also in locations with year-round groundwater. On the basis of long-term depistasis of farms from demonstrably humid areas, it can be stated that the occurrence of *Prototheca spp*. is often accompanied by a high density of yeast.

Between 2019 and 2022, a total of 1051 pool milk samples were taken from 21 dairies in the Czech Republic as part of the project, always between the end of April and June. The basic mission of the QK1910092 project was to map the non-bacterial causative agents of

mastitis and their influence on the quality and technological properties of milk. For the diagnosis of non-bacterial mastitis pathogens, samples were sent to the State Veterinary Institute in Jihlava and the Research Institute of Veterinary Medicine in Brno.

Of the total number of pool milk samples taken, only 38 (3.6%) were mycologically negative. Algae *Prototheca spp*. was cultured in 46 pools, which represents a capture rate of 4.37%, with *P. bovis being the dominant pathogen.*

The screening *of Prototheca bovis* was continued in 2023–2025 already outside the project, when the captures from pool milk samples reached values between 4 and 7%. Based on the number of milk samples, it can be assumed that these values are also representative for the territory of the Czech Republic.

Veterinary practice shows that prototheca mastitis affects both large and small herds, and is more common in dairy cows with higher performance. The frequency of positive findings from individual milk samples ranges from 7 to 45%.

## 4. Research and findings

Based on the data obtained during the QK1910092 project, field monitoring and practical experience from the operating conditions of farms, several research and publication activities were carried out.

In cooperation with the Research Institute of Veterinary Medicine, a scientific article "Eradication of bovine mastitis caused by pathogenic microalgae *Prototheca bovis* on dairy cattle farm: a case study″ was created, published in the professional journal Veterinary Medicine in 2024. This workplace also dealt with a new system for rapid detection and quantification of algae published in the journal Med Mycol in 2021.

For the purpose of familiarizing the professional and agricultural public with the issue, the article "Evaluation of the influence of breeding conditions and hygiene of primary production on the occurrence of non-bacterial mastitis pathogens in pool milk samples" was published in the professional journal Náš chov in 2023 in cooperation with the State Veterinary Institute in Jihlava. Among the first articles dealing with the issue was the work of a scientist from the State Veterinary Institute in Olomouc on the topic of "Algae of the genus *Prototheca* as causative agents of cattle mastitis" published in the journal Veterinářství in 2013. Already in 2009, an article was written by the Dairy Research Institute on the topic "The influence of the content of *Prototheca zophii* and *Candida lusitaniae* on the quality of raw milk" published in Mlékařské listy, 112.

Based on the results of the project and practical experience with the solution of prototheca infections in farms, the Dairy Research Institute in Prague developed a certified NAZV QK1910092 methodology for the eradication of Prototheca spp. in farms. The methodology was approved by the State Veterinary Administration of the Czech Republic in 2023.

The methodology contains a comprehensive overview of the issue, including the characteristics of the pathogen, the conditions of infection, possible sources of infection and the routes of spread. It also includes proposals for preventive and organizational measures aimed at limiting the occurrence and spread of infection in farms.

Practical experience shows that the eradication of protothecal infections is a long-term and organizationally demanding process. The basis of the solution is not therapeutic procedures, but mainly preventive measures, changes in the organization of breeding and consistent hygienic measures during milking.

## 6. Recommendations

Based on the data obtained, research results and practical experience from the field, it is possible to formulate several recommendations aimed at reducing the occurrence of *Prototheca spp*. and improving the control of this issue.

### Recommendations at the farm level

Preventive measures and organization of farms are of fundamental importance. Available evidence shows that:

- consistent hygiene during milking plays a key role, especially disinfection of teats before and after milking, but also during milking,
- it is important to ensure a dry and clean environment for housing animals,
- it is necessary to regularly check the technical condition of the milking equipment and its hygiene,
- it is important to detect positive animals early and separate them from the herd,
- securing the herds so that the infection cannot spread further.

Practical experience also shows that the eradication of *Prototheca spp*. in farms is a long-term process, which is based primarily on organizational and preventive measures, not on therapeutic procedures.

### Recommendations in the field of diagnostics and monitoring

The current situation is characterized by the absence of systematic monitoring of the occurrence of this pathogen. Therefore, it can be recommended:

- extension of diagnostics of non-bacterial mastitis pathogens in routine veterinary practice,
- increasing awareness of the issue among breeders and veterinarians,
- support for targeted monitoring of the occurrence of *Prototheca spp*. at the national level.

**Research recommendations**

The results of previous projects show that the issue of *Prototheca spp*. is still insufficiently explored in the conditions of the Czech Republic. In particular, the following can be recommended:

- continuation of research activities aimed at the occurrence, spread and control of this pathogen,
- further development of methods of diagnosis and identification of individual representatives,
- collection of long-term data to monitor trends.

**System-level recommendations**

From the point of view of the broader framework, it can be stated that the absence of legislative anchoring and systematic monitoring represents a limit in the effective control of this pathogen.

Therefore, the following can be considered:

- inclusion of *Prototheca spp*. among the monitored pathogens within milk quality,
- inclusion of *Prototheca spp*. among key indicators in terms of food safety/FAO/,
- develop best practices for addressing occurrences at national level,
- using an already developed methodology that has been proven in practice,
- possible coordination of approaches within the V4 countries.