

Report of the Thailand Poster Competition on the Theme “How Microbes Make Milk”

Organized by the Institute for the Promotion of Teaching Science and Technology (IPST) in collaboration with the Microbiology in Schools Advisory Committee (MiSAC, UK), the IPST Foundation, and King Mongkut's University of Technology Thonburi (KMUTT).

Cow's milk is a highly nutritious food and plays an important role in the health and development of Thai people. Learning about microorganisms and milk production provides students with an opportunity to understand science through real-world applications and appreciate its relevance to everyday life. Dairy farming is also an important agricultural sector in Thailand. Microorganisms play essential roles in dairy production by supporting forage digestion in cattle, enabling silage fermentation, and contributing to nitrogen fixation in leguminous plants to improve feed quality and reduce production costs. Developing students' understanding of these microbial processes helps build a foundation for sustainable agriculture and improved dairy production.

As part of the 2026 MiSAC Annual Competition, “**How Microbes Make Milk,**” held in the United Kingdom, the Institute for the Promotion of Teaching Science and Technology (IPST) organized the Thailand Poster Competition following the same theme and format. The competition focused on three key topics: (1) the role of microorganisms in the cow digestive system and nutrient acquisition; (2) the role of microorganisms in producing nutritious silage during periods of fresh forage shortage; and (3) the contribution of microorganisms associated with legumes to improving the nutritional quality of cattle feed. These topics aligned with the objectives of the MiSAC competition while reflecting Thailand's agricultural context. Although silage is commonly used during winter in temperate countries, in tropical countries such as Thailand it is primarily used during the dry season when fresh forage is limited.

To support students' scientific understanding, IPST developed a series of educational video resources presented by subject specialists. The videos covered five key topics: (1) how gut microbes help cows obtain nourishment from their food; (2) how microorganisms contribute to the production of nutritious silage during periods of forage shortage; (3) how leguminous plants improve the nutritional quality of feed for dairy cows; (4) the importance of milk for the health and development of Thai children; and (5) Thai dairy farming and self-reliant agriculture.

The competition received an enthusiastic response, with 4,800 students from 870 schools across Thailand participating. Entries were received 1,835 posters from Bangkok (242), the Central region (343), the Northern region (312), the Northeastern region (436), the Eastern region (144), the Western region (92) and the Southern region (266), demonstrating broad participation from across Thailand.

The number of submissions exceeded those of previous competitions organized by IPST. Several factors likely contributed to this strong participation. These included attractive cash prizes, with awards of THB 20,000 for first place, THB 15,000 for second place, THB 10,000 for

third place, and three Honourable Mention awards of THB 5,000 each. Contributing factors also included the specialist learning resources, the opportunity for students in Grades 8–11 to include their posters in university admission portfolios, the introduction of online submission for the first time in an IPST competition, and extensive publicity through the IPST website, Facebook, and LINE.

The competition permitted the use of Artificial Intelligence (AI) under clearly defined conditions. Participants were required to ensure that all images and information complied with copyright requirements and that any AI-generated content was clearly identified. Under these conditions, AI was regarded as a tool to support content development rather than a substitute for scientific understanding. Participants remained fully responsible for the originality, accuracy, and integrity of their submissions. All qualified entries that incorporated AI complied with these requirements by clearly declaring its use.

The Competition Committee observed that AI technology helped students prepare and present their posters more efficiently; however, it did not provide an unfair advantage in the competition. The strongest submissions were distinguished by the quality of their scientific reasoning and their ability to integrate the three required microbial processes—gut microbiomes, silage fermentation, and nitrogen fixation—into a coherent explanation of how microorganisms collectively contribute to milk production. This reflected the students' own conceptual understanding of the competition theme rather than their use of AI.

The winning entries demonstrated a clear understanding of the relationship between microorganisms and milk production. They successfully integrated the required scientific concepts to explain how microbial processes contribute to the production of high-quality milk. In addition to scientific accuracy and completeness, the winning posters communicated scientific concepts effectively through well-balanced layouts, appropriate colour schemes, and attractive visual designs that enhanced the clarity and impact of the scientific messages.

The judges were impressed by the overall quality of the submissions, which reflected creativity, scientific understanding, and effective scientific communication. Many posters were visually engaging and made effective use of computer-based design tools to present complex scientific concepts in an accessible and attractive manner. One particularly creative entry, which received an Honourable Mention, presented its scientific content in the format of a newspaper. Other submissions featured distinctive artistic styles, including manga-inspired illustrations, demonstrating the students' imagination and design skills.

Several observations emerged from the judging process. While many posters achieved a high standard of visual presentation, some entries would have benefited from more complete scientific content. Similar to the MiSAC competition, some students were inconsistent in the correct use of scientific names, particularly in the spelling and formatting of genus and species names. Encouragingly, many participants incorporated QR codes linking to references or additional sources of information, providing an effective alternative to listing references

directly on the poster. The judges also noted that a small number of posters used font colours and background colours that reduced readability.

While AI proved to be a valuable tool for supporting poster development, participants remained responsible for carefully reviewing and verifying all AI-generated content before submission. In a few cases, spelling and formatting errors, including those in Thai-language content, remained in the submitted posters. This highlights the importance of proofreading and verifying the accuracy of all content, regardless of the tools used during its preparation.

Special appreciation is extended to **Dr. Margaret Whalley**, MiSAC Coordinator, for her continuous guidance and valuable advice throughout the planning and implementation of the Thailand Poster Competition. Sincere thanks are also extended to the **Microbiology in Schools Advisory Committee (MiSAC, UK)** for providing Thailand with the opportunity to participate in the 2026 Annual Competition, and to the **IPST Foundation, King Mongkut's University of Technology Thonburi (KMUTT)**, and all Thai partners for their invaluable collaboration and support. Appreciation is further extended to the **IPST organizing team** for their dedication in coordinating the competition, managing thousands of submissions, and supporting the judging process. Finally, sincere thanks are extended to all members of the Competition Committee, judges, subject specialists, teachers, and students whose expertise, dedication, and enthusiasm contributed to the success of the Thailand Poster Competition.