The Asian Compass (The Philippines)
17 October 2025

New non-antibiotic compound could save dairy industry billions

SINGAPORE [TAC] — A team of international scientists has developed a new, non-antibiotic compound to prevent bovine mastitis, a widespread bacterial infection that costs the global dairy industry an **estimated $22 billion annually**.

Led by Nanyang Technological University, Singapore (NTU) and the Singapore-MIT Alliance for Research and Technology (SMART), the **research** on the novel compounds were successfully tested in a preliminary farm trial.

The new class of antimicrobials were applied to cow teats and shown to stave off udder infection after the animals were exposed to bacteria, offering a safer and more sustainable alternative to traditional antibiotics and harsh chemical disinfectants.

Bovine mastitis—the infection of the cow udder—is a persistent problem. It is currently treated with antibiotics, a practice that faces two major problems: the rise of antibiotic-resistant bacteria and concerns over antibiotic residues contaminating milk, leading to product loss.

“Our study has unveiled an alternative class of potent antimicrobial compounds that could be used in the agriculture industry to combat multi-drug-resistant bacteria,” said Professor Mary Chan of NTU Singapore and a co-lead of the research.

The new compounds, called “oligoimidazolium carbon acids” (OIMs), kill bacteria in a new and highly potent way. Unlike traditional disinfectants, OIMs convert into structures called carbenes that slip past the bacteria’s protective membranes to damage their DNA, requiring lower doses and reducing the chance of side effects.

Safer for cows, environment

The OIMs offer significant benefits over current prevention methods, which typically involve antiseptic solutions containing iodine or chlorhexidine. These existing chemicals can irritate the cows’ udders, increasing the risk of cracking and subsequent infection, and are a source of environmental pollution.

Preliminary trial demonstrated the OIMs did not irritate the cows’ udders; did not spoil the milk or make it unsafe for consumption; and were completely unaffected by milk, unlike existing disinfectants which become less effective upon contact. Also, the compounds are biodegradable, breaking down into non-toxic, non-polluting natural molecules.

“The OIMs are biodegradable… so we expect them to be more environmentally friendly than using iodine or chlorhexidine,” explained Dr. Kaixi Zhang, a research scientist at SMART and a co-author of the study.

Following the success of the initial lab and field tests, the research team is now planning to scale up their work through a spin-off company. They have already launched a large farm trial in Malacca, Malaysia, to optimize the compound.

The development has attracted significant commercial interest, with several agricultural companies in Australia, Belgium and New Zealand expressing interest in adopting the compounds.

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