



DairyNews7x7 (India)

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## Safer antimicrobials developed to prevent bovine mastitis



A research collaboration between **Nanyang Technological University (NTU), Singapore**, the **Singapore-MIT Alliance for Research & Technology (SMART)**, and **MIT (USA)** has developed a new class of antimicrobial compounds — **oligoimidazolium carbon acids (OIMs)** — that could revolutionize bovine mastitis prevention.

Mastitis, a chronic udder infection, costs the global dairy industry an estimated **US\$22 billion annually** through milk losses, treatment costs, and animal health deterioration. Traditional antiseptics and antibiotics used for teat dips often lead to **resistance, milk residues, and skin irritation**, posing both quality and environmental challenges.

In **farm-level trials**, OIM-based dips prevented bacterial infections without harming the cow's skin or behaviour, and **no traces were detected in milk** after routine cleaning. The compounds are **biodegradable**, breaking down into safe, natural molecules, and act through a novel mechanism — forming *carbenes* that penetrate bacterial membranes and disrupt DNA — enabling strong antimicrobial action at lower doses.

### Key Numbers at a Glance

#### ***Bovine Mastitis & Safer Antimicrobials***

Parameter	Global / India Context	Insight / Source
Global economic loss from mastitis	~US\$22 billion annually	Feedstuffs (2025), NTU–MIT study

Parameter	Global / India Context	Insight / Source
<b>Mastitis incidence (global avg.)</b>	25–40 cases per 100 cows/year	FAO, Dairy Global (2024)
<b>India’s economic loss</b>	₹13,000–15,000 crore per year	NDDDB, ICAR–NDRI estimates
<b>Share of subclinical mastitis</b>	~70–80% of total cases	NDRI, Karnal (2023)
<b>Current teat dip actives</b>	Iodine, chlorhexidine, lactic acid	Widely used but can cause irritation/residues
<b>New compound type</b>	<i>Oligoimidazolium carbon acids (OIMs)</i>	Developed by NTU–MIT–SMART consortium
<b>Residues in milk</b>	None detected post-cleaning	Farm trial, Feedstuffs (2025)
<b>Mechanism of action</b>	Converts to <i>carbenes</i> → penetrates bacterial membrane → damages DNA	NTU–MIT study
<b>Biodegradability</b>	Breaks down into non-toxic molecules	Environmental safe profile
<b>Commercial trials underway</b>	Malaysia, Australia, Belgium, New Zealand	Global validation in progress

### Key Takeaway:

Bovine mastitis remains one of the **costliest dairy diseases** worldwide. Innovations like **biodegradable OIM antimicrobials** could transform udder health management — making milk safer, cleaner, and residue-free without compromising animal welfare. Researchers note strong **industry interest** from Australia, Belgium, Malaysia, and New Zealand, with larger trials now underway to validate efficacy and safety under diverse farm conditions.

### Industry Insight:

This breakthrough directly addresses dairy’s **antimicrobial resistance (AMR)** and **residue management** challenges — two of the biggest global regulatory priorities. If scaled successfully, OIMs could reduce withdrawal periods, lower discard losses, and enhance consumer trust in “clean milk.”

The innovation also fits into the broader **sustainability agenda**:

being **biodegradable** and **low in toxicity**, OIMs could replace iodine and chlorhexidine dips that often contaminate water and soil.

However, commercialization will depend on **cost efficiency, regulatory approvals**, and performance consistency across breeds and climates. For India, where mastitis is among the top causes of economic loss in dairy herds, this innovation could align well with the **FSSAI's residue-free milk** vision and national AMR action plan.

As the global dairy sector moves toward low-carbon and safe production, **science-led, residue-free hygiene solutions** like OIMs could redefine the future of udder health management.

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