



**STAR
IDAZ**

International
Research
Consortium on
Animal Health

Short Summary of the Workshop on Bovine Mastitis Gap Analysis

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More information on STAR-IDAZ IRC can be found at www.star-idaz.net

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STAR-IDAZ IRC Workshop: Bridging Research Gaps in Bovine Mastitis

On August 14, 2024, STAR-IDAZ IRC hosted a workshop at Ghent, held in conjunction with the National Mastitis Council Regional Meeting at De Bijloke, Gent, Belgium. This workshop was a key event for discussing advancements and addressing critical gaps in the management of bovine mastitis. The workshop built further on the work conducted by a DISCONTTOOLS expert group on *Staphylococcus aureus* and *Streptococcus* mastitis. As part of STAR-IDAZ IRC's mission to coordinate global research in animal health, the workshop fostered collaboration and strategic planning on topics such as antibiotic alternatives, diagnostics, and vaccine development. The primary goal was to identify major gaps to develop roadmaps to direct future research efforts, ultimately enhancing bovine mastitis management and improving animal health outcomes worldwide.

The workshop commenced with an overview of STAR-IDAZ IRC's global research coordination efforts, highlighting its role in bridging gaps in bovine mastitis research. The importance of advancing diagnostics and therapeutic strategies was emphasized, particularly for pathogens such as *Staphylococcus aureus* and *Streptococcus* species. Presenters underscored that existing diagnostic tools are inadequate, and innovative approaches are essential to meet the diverse needs of the different regions of the world. The necessity for alternatives to antibiotics was also addressed, as many farms increasingly move away from traditional antibiotic use, particularly for non-severe cases of mastitis.

One promising alternative discussed was phage therapy. Phage therapy has demonstrated potential for treating antibiotic-resistant bacterial infections. However, personalized application methods and additional research on biosafety are critical for its successful integration into veterinary practice. Similarly, probiotics and synbiotics were explored as preventive measures. While these options show promise, more research is needed to validate their effectiveness, especially for intramammary applications in dairy cattle.

Vaccine development was another focal area. Presenters noted that the complexity of pathogen variability poses significant challenges, and current vaccine options remain limited in scope. Research is progressing with new techniques in antigen discovery and innovative delivery methods. However, there is a need for more advanced immunological tools to better understand immune responses in cattle. The use of technologies like single-cell transcriptomics could provide essential insights to drive future vaccine development efforts.

The workshop highlighted the importance of regional perspectives, as mastitis management strategies often vary across different parts of the world. In addition, it emphasized the need to consider diverse stakeholder views, from dairy producers to consumers, to ensure that research aligns with practical needs and addresses local context-specific challenges. The participants agreed that fostering continuous updates to the STAR-IDAZ roadmaps, and promoting collaboration, are crucial for sustained progress in the field.

In conclusion, several actionable next steps were outlined. The development of clear guidelines for phage therapy applications in veterinary settings was prioritized. Further research into personalized treatment approaches, particularly for high-value dairy operations, was recommended. Additionally, ongoing evaluation of vaccine candidates with a focus on both broad-spectrum and strain-specific efficacy is essential to meet the demands of different regions. The integration of artificial intelligence and advanced vaccine platforms was also highlighted as a pathway for enhancing diagnostic and treatment solutions. With these directions, STAR-IDAZ IRC aims to continue bridging research gaps and improving bovine mastitis management on a global scale.

Acknowledgments

The STAR-IDAZ IRC workshop on Bridging Research Gaps in Bovine Mastitis was made possible through the invaluable contributions of our dedicated presenters, chairs, and engaged participants. We extend our deepest appreciation to the following experts for their valuable contribution and leadership:

- **Fernando Souza** (Federal University of Alagoas/University of São Paulo, Brazil) for his presentation on the DISCONTTOOLS Gap Analysis for *Staphylococcus aureus* and Streptococcal mastitis, and for chairing discussion sessions.
- **Vinicius da Silva Duarte** (Norwegian University of Life Sciences), who chaired the session on alternatives to antibiotics and presented on the role of synbiotics in mastitis management.
- **Luís Melo** (University of Minho, Portugal) for his presentation on the potentials and challenges of phage therapy as an antibiotic alternative, and for chairing discussion sessions.
- **Orla Keane** (Teagasc, Ireland) for chairing the vaccine development session and sharing advancements in antigen discovery and delivery.
- **Ruth Zadoks** (University of Sydney, Australia), for leading the wrap-up session and helping to outline priorities and next steps.

We are also grateful to the numerous participants from diverse institutions and backgrounds, whose active engagement and contributions enriched our discussions. Together, our efforts are helping shape a strategic roadmap to address the pressing challenges in bovine mastitis management and advance animal health worldwide.

Agenda (3 hours)

Session 1: Setting the scene (45 min)

Chair: Johannes Charlier, Kreavet, Belgium

- Introduction to STAR-IDAZ IRC and overview on the workshop objectives (Johannes Charlier, Kreavet / secretariat STAR-IDAZ IRC – 10 min)
- DISCONTTOOLS gap analysis on *S. aureus* and Streptococcal mastitis (Fernando Souza, Federal University of Alagoas/University of São Paulo, Brazil) – 15 min
- STAR-IDAZ roadmaps, how do they work? (Latifa Elhachimi, Kreavet / secretariat STAR-IDAZ IRC) – 10 min
- Questions and discussion – 10 min

Session 2: Alternatives to antibiotics in mastitis management (45 min)

Chair: Vinicius da Silva Duarte, University of Life Sciences, Norway

- The role of synbiotics, prebiotics and probiotics in mastitis prevention (Vinicius da Silva Duarte, University of Life Sciences, Norway) – 15 min
- Phage therapy and phage-derived enzymes: potentials and challenges (Luís Melo, University of Minho, Portugal – 15 min)
- Group discussion: Key gaps and which need to be addressed first? – 15 min

COFFEE BREAK – 30 min

Session 3: Mastitis vaccine development (45 min)

Chair: Orla Keane, Teagasc, Ireland

- Mastitis vaccines – harnessing the potential of recent advances in antigen discovery and delivery (Orla Keane, Teagasc, Ireland) -
- Charting new paths: identifying critical gaps in bovine mastitis research and vaccine design (Fernando Nogueira Souza, Federal University of Alagoas/University of São Paulo, Brazil)
- Group discussion: Key gaps and which need to be addressed first? – 15 min

Session 4: Conclusions (15 min)

Chair: Ruth Zadoks, University of Sydney, Australia

- What have we learned? What are the next steps?