



STAR-IDAZ
International Research
Consortium on Animal Health

Executive summary of priority research needs

Alternatives to Antibiotics

September 2022



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Research Priorities for Alternatives for Antibiotics (ATA)

STAR-IDAZ International Research Consortium (IRC) roadmaps on Alternatives to Antibiotics (ATA) to show where the research effort needs to be focused in order to speed up the delivery of ATA in animal health and production. The development of ATA is recognised an important component in the fight against antimicrobial resistance (AMR) for the benefit of both human and animal health. Working groups of international experts validated the ATA roadmaps and identified the following research gaps as priorities:

Table 1: Main research priorities identified

Topics	Research priorities
Mechanisms behind antibiotics as growth promoters:	<ul style="list-style-type: none"> • Understand mechanisms of how antibiotics work as growth promoters, to develop other alternatives • Create appropriate in-vivo/ex-vivo/in-vitro models • Basic research to better characterise microbiota • Standardized methods to test mechanism of sub-antibiotic concentrations and defined goal (growth vs feed conversion rate)
Phage technologies:	<ul style="list-style-type: none"> • Phage-bacteria interaction studies • In-vivo models and trials • Investigate phage survival in the animal and in the environment • Synthetic biology for retargetable phage-based platforms • Interaction between phage and the immune system • High throughput screening platforms for phage isolation/characterisation
Immunomodulators:	<ul style="list-style-type: none"> • Understand interaction between immune responses and inflammation • Mechanisms of host-microbial interaction • Kinetics and quantification of innate response stimulated by immunomodulators or by vaccines (non-specifically) • Functional studies of microbiota • Clearly defined desired outcomes and best practices in testing immunomodulators
Microbiome:	<ul style="list-style-type: none"> • Increase knowledge on the ‘the microbiome’ particularly in different production forms/age-groups • Understand the mode of action of effective probiotics • Functional studies on the microbiome, linking taxonomy with function • Determine the impact of microbiome shaping vaccine efficacy and basic metabolic turnover

STAR-IDAZ IRC and Antimicrobial Resistance

STAR-IDAZ IRC is a global initiative to address the coordination of research programmes at an international level in the area of animal health and in particular infectious animal diseases including zoonoses (STAR-IDAZ – Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses) – for details see <http://www.star-idaz.net/>.

Antimicrobial resistance and the development of innovative ATA was identified by STAR-IDAZ IRC partners as a priority issue for a collaborative approach to research. STAR-IDAZ IRC aims to advance a global research agenda on the development of alternatives to antibiotics (ATA) through a working group of international experts identifying the research priorities. Several workshops were held from 2019 to 2022 to develop the research roadmaps on ATA eliciting more than 60 AMR experts around the world. A full report is available at: https://www.star-idaz.net/app/uploads/2022/10/Star-Idaz-State-ATA-Report-2022_edit.pdf

Research on Alternative to Antibiotics

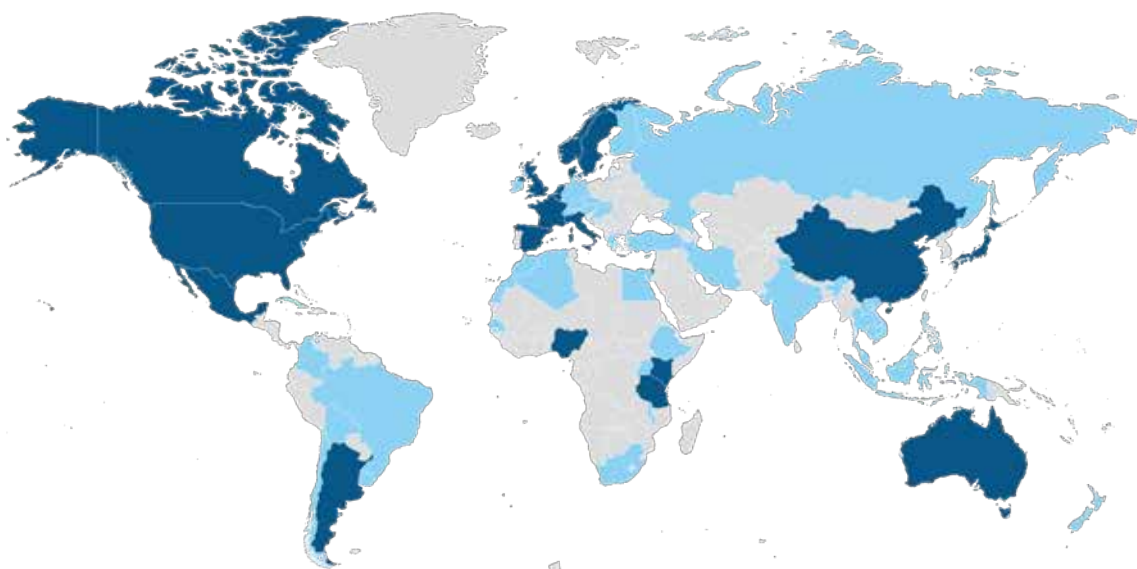
Based on the outcomes of the **ATA symposium** held in Bangkok in 2019, the STAR-IDAZ IRC working group of ATA experts discussed promising research results and new technologies that provide alternatives to antibiotics for use in animal health and production, and assessed the challenges associated with their development and commercialisation. The symposium focused on five product categories that could reduce the use of medically important antibiotics in animal agriculture: 1) vaccines; 2) microbial-derived products; 3) phytochemicals; 4) immune-derived products; and 5) innovative drugs, chemicals and enzymes. Alternatives to antibiotics were broadly defined as any substance that can be substituted for therapeutic drugs that are increasingly becoming ineffective against pathogenic bacteria, viruses or parasites, due to resistance.

As vaccines and chemotherapeutics (including phytochemicals and antimicrobial peptides), as well as disease control methods, are covered by the **vaccine, therapeutics** development and **disease control** research roadmaps respectively, the subsequent research gap-analysis workshops focused on aspects that needed further investigation such as phage technology, immunomodulators, the microbiome and how it might be manipulated and how antibiotics work as growth promoters.

Roadmaps that show the significant steps that have to be taken and problems that have to be solved for developing ATA are available on the STAR-IDAZ IRC website. During each workshop the research priorities within the main topics discussed were identified by experts utilising an online tool for voting. In Table 1, the main research priorities identified are summarised.

Conclusion

STAR-IDAZ IRC, as suggested by the ATA working group, recommend research funding over the above listed research priorities to speed up the delivery of ATA for animal health, in support of fighting AMR for the one health benefit.



30 Partner organisations

20 Countries

55 Associated countries


\$2.5b Research investment



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Are you a animal health research funder/programme owner wishing to join the STAR-IDAZ International Research Consortium?

Please contact v.mariano@woah.org for more information

