STAR-IDAZ
Global Network for Animal Disease Research

OIE
WORLD ORGANISATION FOR ANIMAL HEALTH

Prioritization of Diseases for which Vaccines Could Reduce Antimicrobial Use in Animals

United Kingdom Embassy, Washington DC
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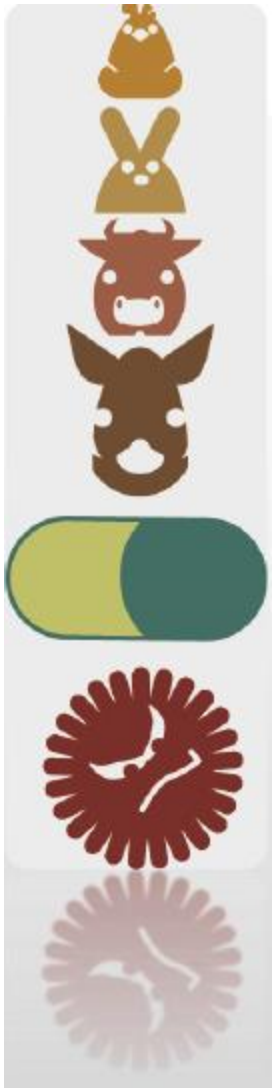
USDA
United States Department of Agriculture
Agricultural Research Service



Recommendations

13. To support relevant research to improve the understanding of the efficacy of current antimicrobial agents with the aim to prolong their usage while minimising the development of resistance, to develop new molecules **and to find alternatives that could be used in animal production for antimicrobial agent substitutions.**

http://www.oie.int/eng/A_AMR2013/Recommendations.htm

OIE *ad hoc* Group on prioritisation of diseases for which vaccines could reduce antimicrobial use in animals

- "Provide guidance on prioritisation of disease for which the use of already available and new vaccines could reduce antimicrobial use in animals, focusing on pigs, poultry, fish (April 2015), and ruminants (May 2018)"



- Identify actions to improve utilisation of such vaccines

- To support the WHO Global Action Plan on AMR which makes provision for such approach

Table 2: Infections for which new or improved vaccines would significantly reduce the need for antibiotic use in swine

Key syndrome	Primary pathogen(s) (disease)	Antibiotic use	Commercial* vaccine exists	Major constraints to use of vaccine / vaccine development	Vaccine research priority
Systemic (respiratory)	*Streptococcus suis*	High	Yes	• Strain coverage too narrow • Lack of cross-protection • Poor immunogenicity due to being a capsule based vaccine	High
	Haemophilus parasuis	Medium	Yes	• Serotype specific with variable cross-protection • Maternal antibody interference	Medium
Respiratory	*Pasteurella multocida (for pneumonic disease)*	High	No	• No vaccine with approved label claim for pneumonia (There is a vaccine for atrophic rhinitis)	High
	Mycoplasma hyopneumoniae	High	Yes	• Does not completely prevent lung lesions • Animals continue to shed pathogen • Diagnostics not always accurately done	Low
	Actinobacillus pleuropneumoniae	High	Yes	• Limited coverage • Good immunity only if serotype specific • Sub-unit vaccine which affords cross-protection	High
	Porcine Reproductive and Respiratory Syndrome virus (secondary bacterial infections)	High	Yes	• Strain coverage limited • High virus mutation rate • Modest cross-protection • Vaccine evasion	High
	Swine Influenza Virus (secondary bacterial infections)	High	Yes	• Strain matching • Vaccine-associated enhanced respiratory disease (VAERD) • Lack of cross-protection • Efficacy in piglets limited	High
Enteric – neonatal	*Escherichia coli*	High for the syndrome, Low for *E. coli*	Yes	• Maternal vaccine provides effective lactogenic immunity • Coverage of enterotoxigenic *E. coli* may occasionally need to be updated	Low
Enteric (weaners/finishers)	*Escherichia coli*	High	Yes	• Maternal antibody interference • Short window for induction of immunity	High
	Lawsonia intracellularis	High	Yes	• Other pathogens in the syndrome (*Brachyspira*) not included • Antibiotic-free window for vaccination required (live attenuated oral vaccine)	Low (see also *Brachyspira*)
	Brachyspira spp *B. hyodysenteriae,* *B. pilosicoli*	Medium-high	No	• Low current research investment as changes in husbandry largely eliminated the disease • Technical barriers to vaccine development	High
	Rotaviruses (secondary bacterial infections)	High	Yes	• Reasons limiting wider adoption unknown	High

Report Conclusions

Vaccine research could have a significant impact, particularly if it addressed the following four priority gaps:

- Maternal antibody interference
- Cross-protection or inclusion of relevant strains in vaccine formulations
- Occurrence of immunological interference in multivalent vaccines
- Innovative delivery systems to enable mass-vaccination

Veterinary Research

https://www.biomedcentral.com/collections/alternatives-to-antibiotics

Vaccines as alternatives to antibiotics for food producing animals. Part 1: challenges and needs

Authors: Karin Hoelzer, Lisa Bielke, Damer P. Blake, Eric Cox, Simon M. Cutting, Bert Devriendt, Elisabeth Erlacher-Vindel, Evy Goossens, Kemal Karaca, Stephane Lemiere, Martin Metzner, Margot Raicek, Miquel Collell Suriñach, Nora M. Wong, Cyril Gay and Filip Van Immerseel

Vaccines as alternatives to antibiotics for food producing animals. Part 2: New approaches and potential solutions

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Microbial-derived products as potential new antimicrobials

Authors: Bruce S. Seal, Djamel Drider, Brian B. Oakley, Harald Brüssow, David Bikard, Joseph O. Rich, Stefan Miller, Estelle Devillard, Jason Kwan, Gérard Bertin, Stuart Reeves, Steven M. Swift, Margot Raicek and Cyril G. Gay

Phytochemicals as antibiotic alternatives to promote growth and enhance host health

Authors: Hyun Lillehoj, Yanhong Liu, Sergio Calsamiglia, Mariano E. Fernandez-Miyakawa, Fang Chi, Ron L. Cravens, Sungtaek Oh and Cyril G. Gay

The potential for immunoglobulins and host defense peptides (HDPs) to reduce the use of antibiotics in animal production

Authors: Albert van Dijk, Chris J. Hedegaard, Henk P. Haagsman and Peter M. H. Heegaard

Innovative drugs, chemicals, and enzymes within the animal production chain

Authors: Yousef I. Hassan, Ludovic Lahaye, Max M. Gong, Jian Peng, Joshua Gong, Song Liu, Cyril G. Gay and Chengbo Yang

Biologicals
Volume 53, May 2018, Pages 72-75

https://www.sciencedirect.com/science/article/pii/S1045105618300587?via%3Dihub

Regulatory pathways to enable the licensing of alternatives to antibiotics

Authors: Faye Ioannou, Cindy Burnsteel, David K.J. Mackay, Cyril G. Gay

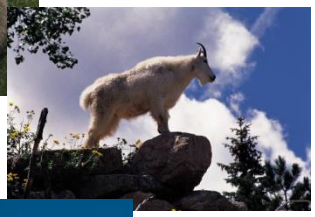
The 3rd International Symposium on Alternatives to Antibiotics in Animal Production

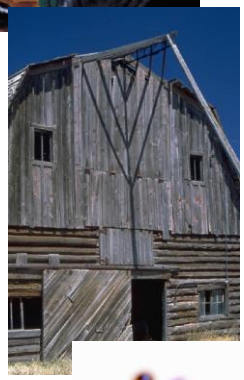
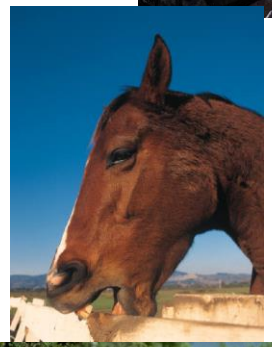
26 - 28 November 2019
The Berkeley Hotel, Bangkok, Thailand

https://www.ars.usda.gov/alternativestoantibiotics/

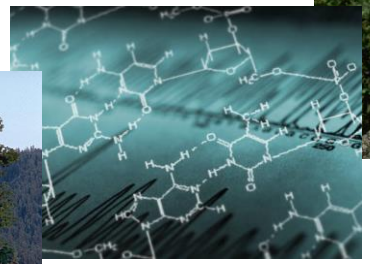










Thank you!

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www.usda.ars.gov