

## REDUCING THE USE OF ANTIBIOTICS THROUGH NATURAL ALTERNATIVES AND IMPROVED MANAGEMENT

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**Abstract:** This paper explores strategies for reducing antibiotic use in food-producing animals through the adoption of natural alternatives and improved farm management practices. The authors begin by providing an overview of antimicrobial use in livestock production, highlighting the challenges associated with the declining rate of novel antibiotic development and the increasing global concern over antimicrobial resistance. In this context, the growing interest in natural antimicrobial compounds is discussed, alongside broader efforts to limit the emergence and spread of resistance in both human and animal populations. Drawing on an extensive bibliographic review, the study focuses specifically on sheep as a livestock species particularly vulnerable to diseases caused by bacteria, parasites, and viruses. The authors emphasize that reliance on antibiotics alone is no longer a sustainable strategy and that alternative approaches are required to maintain animal health while preserving treatment efficacy. The paper identifies two main complementary pathways for reducing antibiotic usage. The first involves improved antibiotic stewardship and management, including more responsible use protocols, targeted treatments, and preventive health monitoring. The second pathway highlights the use of natural alternatives with antimicrobial properties, such as plant-derived compounds, essential oils, probiotics, and other bioactive substances that can support immune function and reduce pathogen load. The study concludes that effective reduction in antibiotic use can only be achieved through an integrated approach combining rational drug management with scientifically validated natural alternatives. Such a strategy contributes not only to improved animal health and productivity but also to broader efforts in combating antimicrobial resistance in agricultural systems.

### • Introduction

The use of drugs in food animals is an extremely complex issue. It has been studied from perspectives such as production practices; benefits and risks; drug development, government approval, and regulatory processes; monitoring and enforcement of drug residues and microbial contamination in food; issues specific to antibiotic; costs of eliminating subtherapeutic use of antibiotics; and approaching to minimizing use in food-animal production. It is worth noting that the rate of developing novel antibiotics has decreased from since 1940 (Figure 1), which could also explain the increasing interest in developing natural antimicrobials (Figure 2). Reducing antibiotic use in animals effectively involves two complementary strategies – improving how antibiotics are managed in agriculture, daily life, and medicine; and using eco-friendly or natural antimicrobial alternatives in food animals – strategies that help protect the long-term effectiveness of life-saving drugs and slow down antimicrobial resistance at different levels.

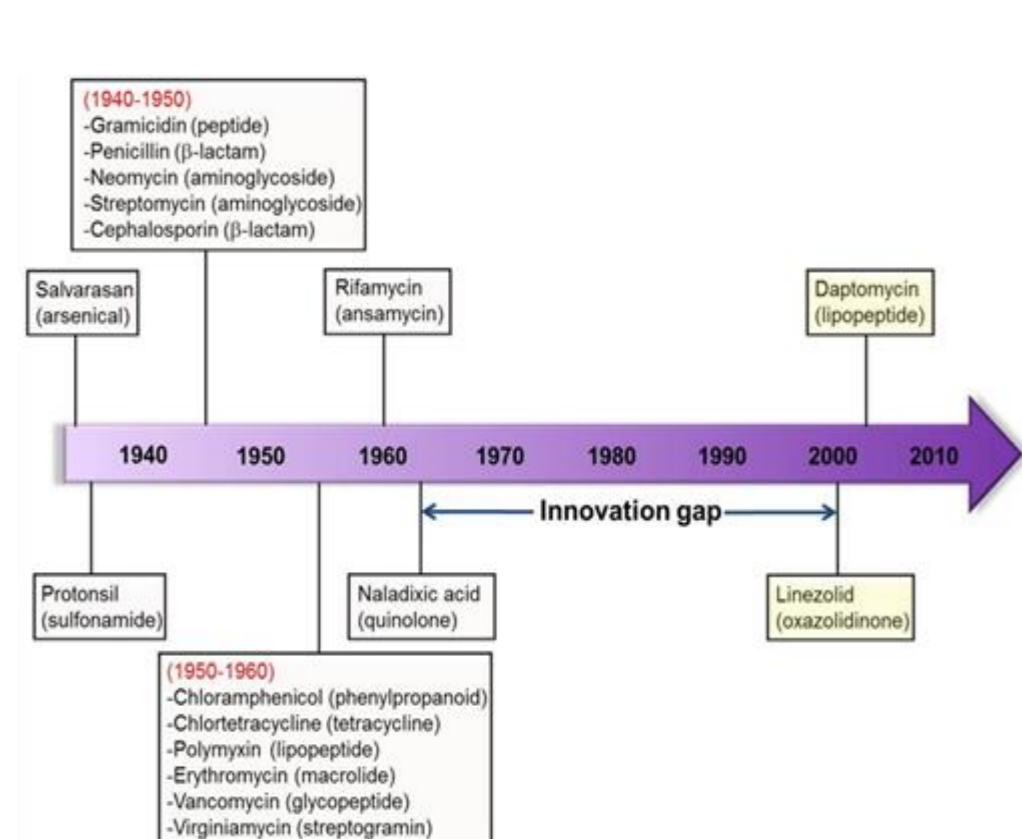


Figure 1. Emergence of novel antibiotics between 1940 and 2010

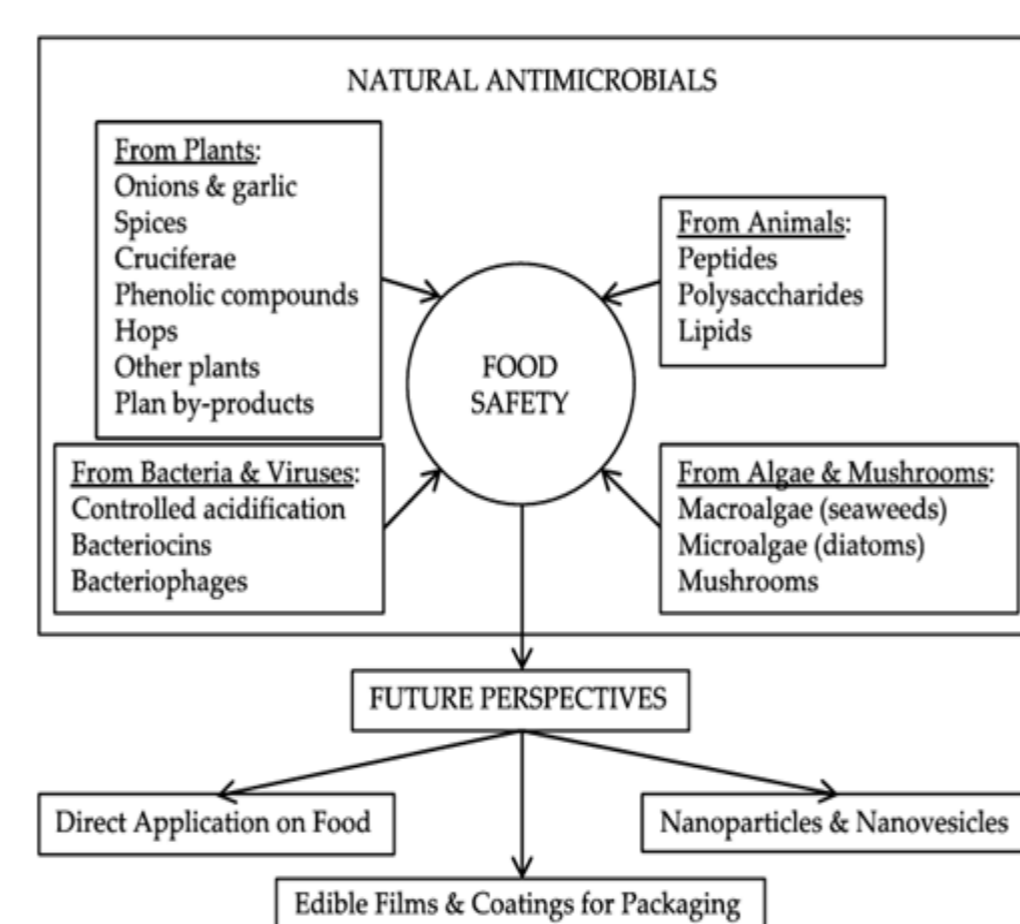


Figure 2. Natural antimicrobials and their role in food safety

### • Material and method

The material used in this paper consists in scientific papers published in prominent journals in the last 13 years, papers that illustrate in a very convincing manner, the new trends in the field of reducing the use of antibiotics through natural alternatives and improved management. The research method embraced by the authors is the bibliographical one.

### • Results and discussion

Reducing the use of antibiotics through natural alternatives and improved management includes improved antibiotic management and natural alternatives with antimicrobial potential.

#### A. Improved antibiotic management

A better management – no matter the field – can reduce unnecessary antibiotic exposure and slow antibiotic resistance. The main strategies to do so are:

- Focusing on agriculture and animal health, because:
  - Overuse in livestock accelerates antibiotic resistance, while eco-friendly antimicrobial alternatives and improved hygiene practices can reduce the need for antibiotics in sheep farming;
  - Sustainable approaches highlighted in recent research aim to protect both ecosystems and human health.
- Protecting the environment, because:
  - Antibiotics entering water systems disrupt microbial ecosystems and contribute to antibiotic resistance;
  - Better waste management and natural antimicrobial solutions help reduce environmental contamination.
- Using medicine responsibly, because:
  - Antibiotics should be used only when necessary, at the right dose and duration, and only for bacterial – not viral – infections;
  - Healthcare systems increasingly emphasize programs to guide appropriate prescribing.

#### B. Natural alternatives with antimicrobial potential

Natural compounds cannot replace prescribed antibiotics for serious infections, but research shows they can support mild cases, overall resilience, and prevention.

### • Conclusions

Antimicrobial resistance of both animals and humans is rising globally, making infections harder to treat. In addition, it has been estimated that, by 2050, the percentage of people dying because of antimicrobial resistance will be 10%. Natural alternatives and improved management work together to preserve antibiotic effectiveness for serious infections; to protect the environment; to reduce unnecessary antibiotic exposure; and to slow the evolution of resistant bacteria.