

Antimicrobial Resistance in Livestock: A Menace

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Introduction

Antimicrobial Resistance is turning into a global menace leading to a significant threat to both livestock and human health care system. It is the ability of the microorganisms such as viruses, bacteria, fungi and parasite to thrive the drugs designed to nullify them. Antibiotics are used as atherapeutic agent to cure diseases, prophylactic and metaphylactic agent to control the spread of infection as well as growth promoters to increase the growth rate bringing hike in productivity of animals. However, the inappropriate or excessive use of the same in livestock can fuel the development and rise of antimicrobial resistant microbes in animals. The consumptions of antimicrobials in food animals globally were estimated at 63,151 tons (-+ 1650) tons in 2010 and at 131,109 tons in 2013. A rise up to 200,235 tons has been anticipated by 2030. Coming to India, its share in global consumption of antimicrobials in food animals is 3%. This article explores the implications of antimicrobial resistance and highlights the urgent need to combat the rising crisis by coordinated global efforts.

Factors contributing to antimicrobial resistance include

Indiscriminate use of antimicrobials as curative agent, growth promoters, prophylactic agent in an urge to increase the productivity within a very short period of time and thus spike the income of the intensive livestock production system. Poor animal husbandry practices and farm bio security, environmental contamination by resistant microbes through contaminated animal waste, agricultural runoff, improper animal carcass disposal methods leading to stressful conditions which can increase the risk of disease outbreaks in livestock. This in turn favours the resistance of the microbes towards the drugs. Over the counter availability of the antibiotics, low quality medicines, not following the minimum course of the drug by the livestock owners, lack of restrictive legislation enforcement by the government, inadequate

public awareness contribute to the evolution of resistant genes among the microbes present in the environment.

Consequences of antimicrobial resistance in livestock

- Common infections in livestock become resistant to antimicrobials thus complicating the management of many infectious diseases leading to increased morbidity and mortality rate among animals
- Anti-microbial resistant bacteria increase the magnitude of human health hazards through contaminated milk, meat, egg, other animal products and thus threatens the food safety
- It endangers the concept of animal health and welfare, animal productivity and a quality life.
- If any component of the ecological triad gets disturbed the whole ecosystem suffers. Spillage of resistant organisms from animals to the humans through direct contact with animals, occupational exposure, or through the environment will lead to devastating public health effects, loss of lives, production loss overburdening the national health and economical status.
- Economic consequences: Antimicrobial resistance contributes to spread of infectious diseases in livestock which may turn into outbreaks. This will lead to loss of livestock numbers, decrease in productivity and fertility, market value degradation and increase in cost associated with disease control and prevention methods. Emergence of antimicrobial resistance also necessitate the use of more expensive and potential antimicrobials causing a strain in finance of livestock owners. If the livestock and their products are found to have high level of resistance it may face trade related restrictions, import bans and decrease in export opportunities.

Addressing the Crisis

- Promoting responsible antimicrobial use by veterinarians, farmers, livestock producers to adhere to dosage instructions, observe withdrawal period for antibiotics, using prescription-based treatments and avoid using antibiotics in animals which are transmitted hazardously in the food chain.

- Rapid and accurate diagnostic tests, use of modern technologies such as polymerase chain reaction (PCR), next generation sequencing, determining antibiotic susceptibility profile of the pathogen and targeted treatment should be practised.
- Using a combination of different antibiotics or using antibiotic combination with non-antibiotic drugs can enhance the efficacy of treatment. Simultaneously different mechanism of actions of different combinations of the drug to nullify the microbe will make it difficult for the microorganism to develop resistance to the multiple drugs.
- Precision medicine can be practised to optimise treatments based on patients genetic and physiological characteristics. Pharmacogenomics can help identify the genetic markers that influence the patient antibiotic response thus the most effective antibiotic can be selected in this way.
- Implementing better bio security and animal welfare, minimising stress, ensuring proper hygiene and sanitation, providing appropriate veterinary care can prevent the ruthless use of antimicrobials.
- Strengthen the surveillance system to effectively monitor the global antibiotic resistance pattern, assess the effectiveness of interventions and implement policy decision likewise.
- Strengthening antimicrobial stewardship programs hold promises in promoting responsible use of antibiotics in healthcare settings.
- Nano technology based approaches should be implemented where nanoparticles are engineered in a way to deliver antimicrobial agents specific to bacterial cells thus enhancing the drug efficacy. Antimicrobial coatings for medical devices can also be developed using nanomaterials which will reduce the microbial contamination and spread of resistant strains.
- Establishing cooperation between government, veterinary professionals, health professionals, researchers, and the pharmaceutical industry to develop new and alternative methods of treatments to combat the emerging threats.
- Increase awareness and educating the public regarding the menace of antimicrobial resistance and encouraging appropriate use of the same. Use of vaccines, herbal medicines, enzyme preparations and implementing strict infection control measures should be encouraged among the integrated farming groups.

Conclusion

Responsible use of antibiotic is a boon, on the other hand irresponsible use of the same is turning into a curse for the society. It depends on us how seriously we consider this matter and how effectively we collaborate to safeguard the present and future of animal and human healthcare. There is an urgent need of implementing suitable policy by involving all the stakeholders for judicious use of antimicrobials to mitigate the unseen menace of future “Super Bugs” which will be most difficult in controlling for the human as well as in livestock’s and birds.

