Antimicrobial Use in Dairy Sector and Resistance
Issue: No Action Today, No Cure Tomorrow!

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ABSTRACT
The recent and emergent issue that has attracted the interest of researchers and policy makers is antimicrobial resistance. The United Nation high level meeting held in the year 2016 at New York triggered antimicrobial resistance as a global priority. This was only fourth time in the history of UN General Assembly was a health topic being discussed. To prevent selection, emergence and spread of resistant genes, prudent use of antimicrobials is very important. This article discusses the linkage of antimicrobial use in dairy sector and antimicrobial resistance.

India is the leading producer of milk and largest in livestock population. But the productivity is quite dismal due to a number of factors such as unavailability of improved breeds and breeding services, targeted preventive health care, proper feeding practices and lack of access to credit facilities. Among the above; poor health of livestock affected with a number of diseases affects the dairy farmer to a large extent due to the economic losses incurred due to decrease in milk yield and subsequent treatment expenses. Generally a dairy animal falling sick due to any microbial infection necessitates swift action and usually antimicrobials are used to treat the ailments (Patnai et al., 2019a). Thus intensification of livestock and milk production to meet the demands of growing global population coincides with the increase in administration of antimicrobials. Animal protein rich diet particularly milk protein for human consumption is rising at an exceptional rate in India. Animal production practices are presently associated with regular use of antimicrobials, thereby increasing selection pressure on bacteria to become resistant (Maron et al., 2013). Dairy sector necessitates antimicrobials to raise animals in a healthy manner and maintain productivity, driving an increase in antimicrobial consumption and thereby leading to antimicrobial resistance.

National Action Plan on Antimicrobial Resistance (2017) states that the global consumption of antimicrobials in livestock was 63,151 (±1,560) units in 2010. Out of the total consumption, India stood at 4th position accounting for 3 percent of the total consumption behind China (23%), USA (13%) and Brazil (9%). Field level research on AMR use in livestock has attracted limited attention and poorly documented in India thus hindering appropriate policy formulations. Research in this aspect has been sporadic and mostly localized which cannot be extrapolated to national level.

The issue of AMR was highlighted by Ranjalkar and Chandy (2019) echoing the call of standard guidelines regarding antibiotic prescription, limiting or banning growth promoter use, restricting over-the-counter sale and initiating pharma covigilance.

BOX-1 {Glossary of Terms}
Antimicrobial: A chemical agent that inhibits the growth or destroys microorganisms. The term antimicrobial agent has been defined as ‘a naturally occurring, semi-synthetic or synthetic substance exhibiting antimicrobial activity (kills or inhibits the growth of microorganisms) and includes agents active against bacteria, protozoa, viruses and fungi. The most commonly used category of antimicrobial agent is the antibiotics; hence antimicrobials and antibiotics are used synonymously.

Antimicrobial Resistance (AMR): In simple words, antimicrobial resistance occurs when antimicrobials that were once used successfully for treating, bacteria, viruses and fungi no longer work to fight infections. When used improperly this once-miracle drugs cause microbes to develop mutations that render antimicrobials ineffective in treating infections.

According to World Health Organization (2014a), the mechanism of antimicrobial residues entering the milk supply is as follows:-
1) Dairy animals that have been treated with antimicrobials produce milk containing antimicrobial residues for a period of time after treatment.
2) Treated cows are therefore required to be excluded from the milk supply (withdrawal period) for a specific time period depending on the disease and drug administered to ensure that antimicrobial residues no longer remain in their milk.
3) Antimicrobial residues enter the milk supply when treated cows are returned to the milking herd early or...
when a cow retains antimicrobial residues in her system for an extraordinary length of time.

Rational antimicrobial use should be an integral part of good veterinary management practices. It is an attitude to maximize therapeutic efficacy and minimize selection of resistant micro-organisms (Varela et al., 2013). Emergence factor of antimicrobial resistant bacteria can be attributed to overuse/misuse/sub-optimal use of antimicrobials by different stakeholders associated in dairy sector like the veterinary pharmaceutical industry, pharmacists, veterinarians, livestock producers/farmers.

BOX-2 [Antimicrobials Use in Dairy Animals]

1. Growth promotion use of antimicrobials (Subtherapeutic)
   Growth promotion use of antimicrobials refers to the use of antimicrobials to increase the rate of weight gain and/or the efficiency of feed utilization in animals by other than purely nutritional means.

2. Disease prevention use of antimicrobials (Prophylactic)
   Disease prevention use (or prophylactic use) of antimicrobials refers to use of antimicrobials in healthy animals considered to be at risk of infection or prior to the onset of clinical infectious disease. This includes use for control of the dissemination of a clinically diagnosed infectious disease identified within a group of animals, and prevention of an infectious disease that has not yet been diagnosed clinically.

3. Treatment use of antimicrobials (Therapeutic)
   Treatment use (or therapeutic use) of antimicrobials refers to use of antimicrobials for the specific purpose of treating an animal(s) with a clinically diagnosed infectious disease or illness.

   Patnaik et al. (2019b) observed in their field study the inclination of dairy farmers towards allopathic treatment for providing quick relief to their animals among the various available treatment methods. Treatment with Indigenous Technical Knowhow (ITK) was also prevalent for minor infections in their study areas of Punjab.

World Health Organization (2015b) has delineated goals to tackle Antimicrobial Resistance. The global action plan includes five strategic objectives:-

1. Improving awareness and understanding concepts and background of antimicrobial resistance
2. Strengthening knowledge through surveillance, innovations and research
3. Reducing the incidence of infection through improved health care and control measures
4. Optimizing antimicrobial agents on a point to point basis using suitable disease identification and prescription practices
5. Increasing investment in developing new antimicrobial classes, diagnostic equipment’s, vaccines and other necessary interventions

What can be done from Veterinarians perspective?
Preserving the effectiveness of antibiotics used in dairy sector can be largely ensured by its responsible use by various stakeholders, veterinarian being at the forefront.

1. Prescribe and dispense antibiotics for dairy animals under your supervision and care and only if necessary.
2. Conduct antimicrobial sensitivity tests before prescribing or administering any antimicrobial.
3. Educate dairy farmers on the risks associated with misuse of antimicrobials and the importance of following withdrawal period after the animal has been administered with antimicrobial.
4. Promote improved animal husbandry hygiene practices in shed and milking, vaccination at regular intervals, and periodic review of dairy farm records
5. Refresh your knowledge on antibiotics use recommendations and changing regulations or guidelines up to date.
6. Prevention of infection by conducting timely training programmes, field days and focus group discussions and providing necessary know-how on feeding, sanitation and vaccines to dairy farmers.
7. Fluoroquinolones, 3rd generation cephalosporins and other antibiotics which are critically important drugs from human health point of view should be used as the second choice drug, only if the first choice drug is not effective.
8. Aware the farmers regarding the risk associated with use of leftover drugs and the importance of completing the antimicrobial course of prescribed medicines.

Patnaik et al. (2019c) on their study on veterinary doctors of Punjab reported that the two major factors influencing their antimicrobial prescribing behavior were providing quick relief to the dairy animals and veterinarians prior experience of treating diseases. Sensitivity testing was carried out only during treatment failure cases only.

CONCLUSION
Antimicrobial resistance is a multiple sectoral threat at global level and swift attention needs to be carried out in
a developing country like India where health care sector and available infrastructure are not so good. Hence policymakers and researchers have turned their attention towards prudent use of antimicrobials with respect to the prescribed guidelines as stated in the treatment of livestock. The stakeholders can serve as the main driving force towards rational use of antimicrobials in dairy animals. The approaches veterinary doctors follow in disease identification and diagnosis and the subsequent way in which the farmers carry out the instructions for treating ailments assumes great importance. The spread and awareness of the prudent use guideline for the clinical veterinarian and farmer is insufficient as this requires surveillance and stewardship programs to understand the current antimicrobial use and ways to develop action plans in tackling the issue effectively.

References


