Indian Poultry Sector:

ROAD MAP TO VIKSIT BHARAT 2047

Prof. (Dr.) Pankaj Kumar Shukla
Dr. Amitav Bhattacharyya

Indian Poultry Sector : Road map to Vikshit Bharat 2047

Editors
Prof. Dr. Pankaj Kumar Shukla
Dr. Amitav Bhattacharyya

Compiled & Published by
B.S. Rana

Price : ₹1599/-
: $25

Published and Printed by
Poultry Punch Publications (I) Pvt. Ltd.
25, Thyagraj Nagar Market, New Delhi – 110003
Cont. No. : +91-9312700599, 7838602297, 7428657214

TABLE OF CONTENTS

Section V: Environment and Sustainability

Section VI: Processing, Value Addition and Food Safety

Section VII: Economics, Entrepreneurships and Policy

Section VIII: Knowledge and Future Perspectives

Antimicrobial Resistance and Stewardship in Poultry

Pragya Joshi and **Pawan Kumar Pareek**

Confederation of Indian Industry Food and Agriculture Centre of Excellence

Introduction

AMR – A Global and National Challenge

Antimicrobial Resistance (AMR) is defined as the resistance of bacterial, viral, parasitic, and fungal microorganisms to antimicrobial medicines that were previously effective in treating infections. While AMR can develop naturally through microbial adaptation, it is being accelerated by several anthropogenic factors like inappropriate use of antimicrobial medicines in health, animal, food, agriculture, and aquaculture sectors, limited access to diagnostic and laboratory services leading to empirical or blanket treatment, and contamination from antimicrobial residues in soil, crops, and water.

AMR has emerged as one of the most pressing health and developmental challenges of the 21st century. It threatens the efficacy of life-saving medicines, compromises food safety, and poses a serious risk to both human and animal populations. The widespread and often indiscriminate use of antibiotics for growth promotion, disease prevention, and metaphylaxis has contributed to the rise of resistant pathogens. These microbes are not confined to farmsthey spread through the food chain, the environment, and even across borders making AMR a critical One Health

priority. AMR is not only a public health threat but also a developmental and economic challenge that undermines progress toward multiple Sustainable Development Goals (SDGs). It has far-reaching implications across sectors from poverty and hunger to economic growth and environmental sustainability. AMR threatens SDG 1 (No Poverty) by pushing vulnerable households into poverty through increased healthcare costs, livestock losses, and reduced productivity. It endangers SDG 2 (Zero Hunger) by compromising livestock health, productivity, and food safety, thereby affecting food security. The growing burden of resistant infections directly impacts SDG 3 (Good Health and Well-being), leading to treatment failures and higher mortality. Moreover, the contamination of aquatic systems with antimicrobial residues poses risks to SDG 6 (Clean Water and Sanitation). Economically, AMR constrains SDG 8 (Decent Work and Economic Growth) by reducing the productivity of livestock-dependent livelihoods. It also challenges SDG 12 (Responsible Consumption and Production) by necessitating greater accountability and sustainable practices in antibiotic use. Finally, tackling AMR requires strong global cooperation and cross-sectoral collaboration, aligning with SDG 17 (Partnerships for the Goals).

Global Context of AMR in Livestock and Poultry

AMR has now become a global public health emergency. In 2019, it was associated with approximately 4.95 million deaths globally, of which 1.27 million were directly caused by bacterial AMR (WHO, 2021), making it one of the leading causes of mortality worldwide. The World Organisation for Animal Health (WOAH) estimates that more than 70% of antimicrobials sold globally are used in animalsparticularly in intensive livestock and aquaculture systems. With global meat and dairy production projected to increase by 60% by 2050, antimicrobial use in animal agriculture is expected to rise further unless mitigated through strong regulatory and sectoral measures. Recognizing the escalating threat of AMR in livestock, several countries have adopted strong policy and regulatory interventions to mitigate its spread. In Asia, countries like

Thailand, South Korea, and Vietnam have implemented bans or restrictions on specific antimicrobials and have adopted National AMR Action Plans aligned with the Tripartite Global Action Plan to ensure a coordinated, One Health approach to tackling AMR. To support the global efforts, a range of international surveillance systems and assessment tools have been developed to strengthen monitoring, data collection, and capacity-building across countries and regions including Global Antimicrobial Resistance and Use Surveillance System (GLASS) established by the World Health Organization (WHO), Central Asian and Eastern European Surveillance of Antimicrobial Resistance (CAESAR), European Antimicrobial Resistance Surveillance Network (EARS-Net), FAO Tools for AMR Surveillance and Capacity Building including FAO-ATLASS (Assessment Tool for Laboratories and AMR Surveillance Systems) and FAO InFARM (International FAO AMR Monitoring System). These international efforts underscore the urgent need for evidence-based interventions, regulatory enforcement, and global collaboration to safeguard both animal productivity and public health.

India's Position and Commitments

India faces an especially complex and multifaceted challenge in addressing AMR, owing to its vast livestock population, rapidly expanding poultry industry, and diverse production systems. With 536.76 million livestock and 851.81 million poultry (20th Livestock Census), India ranks among the world's largest producers of milk, meat, and eggs. It is also the second-largest aquaculture producer globally. However, this remarkable growth in animal production has been accompanied by an increasing reliance on antimicrobials for disease prevention, treatment, and growth promotion, raising concerns about the emergence and spread of resistant pathogens across animal and human populations. The close human–animal interface in India's smallholder and intensive systems further amplifies the risk of AMR transmission, making it a critical public health concern under the One Health framework. According to Murray et al. (2022), India recorded approximately 297,000 deaths directly attributable to bacterial

AMR in 2019, with an additional 1 million deaths associated with AMR-related infections. As per FAO projections (2017), India ranked fifth among the top ten veterinary antimicrobial consumers, accounting for 2.2% of global sales, following China (45%), Brazil (7.9%), the United States (7.0%), and Thailand (4.2%). By 2030, antimicrobial consumption in India's food animal production is projected to increase by 312%, potentially positioning the country as the fourth-largest global consumer of antibiotics in livestock systems. This projected rise underscores the urgent need for coordinated stewardship, regulation, and surveillance.

Recognizing the gravity of the issue, India has implemented several national and sub-national initiatives to address AMR. The National Action Plan on Antimicrobial Resistance (NAP-AMR) 2017–2021 provides a strategic framework for AMR containment under a One Health approach, focusing on awareness, surveillance, rational antimicrobial use, and research. Complementing this, the Guidance for Developing State Action Plans for Containment of AMR (SAPCAR) has facilitated state-level interventions, with Delhi, Madhya Pradesh, and Kerala being among the early adopters. Institutional mechanisms have also been strengthened through initiatives such as the National Antimicrobial Resistance Surveillance Network (NARS-Net) and the National Antimicrobial Consumption Network (NAC-Net), coordinated under the National Programme on AMR Containment by the National Centre for Disease Control (NCDC). In the human health domain, the ICMR's AMR Surveillance and Research Network (AMRSN) continues to generate crucial evidence on resistance trends across clinical settings.

In the animal sector, surveillance has advanced through the Indian Council of Agricultural Research (ICAR), with support from the Food and Agriculture Organization (FAO) and USAID, leading to the establishment of the Indian Network for Fishery and Animal Antimicrobial Resistance (INFAAR) now institutionalized as the All-India Network Project on AMR in Livestock and Fisheries (AINP-AMR). This initiative covers the livestock and fisheries sectors, generating vital data on resistance patterns.

AMR in the Poultry Sector

The Indian Poultry Sector and AMR Linkage

Poultry farming represents one of the most dynamic and rapidly growing segments of India's livestock industry, contributing substantially to nutrition security, rural livelihoods, and the national economy. In 2022–23, the poultry sector added nearly ₹2.5 lakh crores to India's GDP (BAHS 2024), underscoring its role as a key driver of agricultural growth and rural employment. With an annual production of over 140 billion eggs and 5 million tons of poultry meat, India ranks as the second-largest egg producer and the fifth-largest broiler producer globally. Over the past decade, egg production in India has recorded a steady growth of 6.8% per annum, driven by rising incomes, urbanization, changing dietary preferences, and a shift toward protein-rich foods.As India envisions for *Viksit Bharat*by 2047the poultry sector is poised to play a pivotal role in feeding a projected population of 1.6 billion while contributing to economic growth, employment generation, exports, women empowerment and sustainable rural livelihoods. However, the sector's rapid intensification has brought with it significant public health concerns, particularly regarding AMR. The economic pressures to maintain flock health, prevent disease outbreaks, and maximize productivity often leads to the frequent and prophylactic use of antimicrobials. Such practices increase the risk of resistant bacteria emerging at the farm level and subsequently entering the food chain, posing a serious One Health challenge. Findings from the Indian Network for Fishery and Animal Antimicrobial Resistance (INFAAR) highlight this growing concern. Between 2019 and 2022, INFAAR analyzed over 5,000 farm samples from livestock across 32 districts covering milk and rectal swabs from cattle, buffalo, goat, sheep, pig, and poultry. Among these, poultry-origin isolates (722) exhibited the highest resistance rates across most tested antibiotics. *E. coli* isolates from poultry and pigs showed higher resistance levels compared to those from dairy animals, underscoring the greater AMR burden in the poultry value chain.

Entry Points of Antimicrobials in the Poultry Value Chain

Understanding where and why antimicrobials enter the poultry production system is critical for identifying control measures and designing effective AMR stewardship interventions.

1. **Feed and Nutrition Stage:** Feed is the single largest entry point for antimicrobials in poultry production. According to FAO the practice of adding antimicrobials to animal feed has been followed for nearly seven decades not only for disease management but also to enhance growth, feed efficiency, and reduce mortality, thereby improving overall productivity.
2. **Disease Prevention and Health Management:** Antimicrobials are routinely used in poultry flocks for prophylaxis (disease prevention) and metaphylaxis (group treatment when some birds are infected), particularly during stress periods such as transport, vaccination, or abrupt climatic changes. Which leads to sub-therapeutic and inappropriate use.
3. **Therapeutic Use During Production:** Antimicrobials are widely used to treat bacterial diseases such as necrotic enteritis, colibacillosis, coccidiosis-associated infections, and respiratory diseases. Due to the lack of culture and sensitivity testing, broad-spectrum and high-end antibiotics are often used repeatedly, resulting in strong resistance selection pressure. These drugs are easily accessible through veterinary pharmacies, agri-input dealers, and even mobile vendors, often without prescriptions or adherence to withdrawal periods.
4. **Processing Stage:** Improper withdrawal periods before slaughter or egg collection result in antimicrobial residues entering the food chain. Residue testing at slaughterhouses, collection centres, and processing units remains sporadic, and standardized residue monitoring protocols are largely absent.
5. **Environmental Pathways:** The environment acts not only as a sink but also as a reservoir and secondary source of antimicrobial residues

and resistant bacteria that can re-enter the poultry production system. Poultry litter, farm wastewater etc. often contain unmetabolized antibiotics and resistant microbes that contaminate soil, groundwater, and surface water. These contaminated resources can subsequently be reintroduced into the poultry value chain through multiple routes such as the use of contaminated water for cleaning sheds or as drinking water for birds, the reuse of untreated litter as bedding material. The WHO-FAO-WOAH (2023) Tripartite has identified environmental dissemination of AMR as one of the fastest-growing yet least-regulated risk pathways globally.

Major Concerns Related to AMR in the Poultry Sector

1. **Overuse and Misuse of Antibiotics:** Antibiotics in poultry are commonly used not only for treatment but also for disease prevention and growth promotion. Such indiscriminate use heightens exposure and resistance risk. Many farmers rely on peer practices rather than veterinary guidance, driven by limited awareness, weak advisory and extension services. Sharma et al. (2014), in their study on *Knowledge and practices related to antibiotics among poultry farmers in Assam and Karnataka*, found that many farmers administered antibiotics prophylactically and had limited understanding of antimicrobial resistance (AMR), highlighting the concerns of overuse and misuse of antibiotics.

2. **Weak Biosecurity and Poor Farm Hygiene:** Inadequate biosecurity, poor hygiene, and lack of good management practices significantly raise the disease burden on poultry farms, forcing greater reliance on antibiotics. This not only fuels AMR but also leads to environmental contamination, allowing resistance genes to spread into surrounding ecosystems via air, water and waste. Small-scale farms in India often struggle with economic viability, limiting their ability to invest in infrastructure and biosecurity upgrades. The Centre for Science and Environment (CSE, 2017) in a study conducted across North Indian states found considerable levels of antibiotic residues in poultry and

multidrug-resistant bacteria in poultry litter and farm soil. The report further revealed that multidrug resistance is spreading from farms to agricultural fields, as seen through similar resistance patterns of *E. coli* isolates in both litter and agricultural soil, indicating poor waste management and hygiene practices as key contributors to environmental AMR dissemination.

3. **Inadequate Diagnostics and Limited Access to Biologicals:** The underutilization of diagnostic tools such as Polymerase Chain Reaction **(**PCR) and Antibiotic Sensitivity Testing (ABST) has led to ineffective and often unnecessary antibiotic use in poultry farming. Veterinarians, especially those working in the field, often lack training and access to these diagnostic methods. According to the National Institute of Agricultural Extension Management (MANAGE) report titled *"Livestock Extension Services: Time to Think Beyond Treatment and Breed Improvement" (2021)*, the Indian livestock sector continues to face significant challenges due to inadequate infrastructure and shortage of skilled human resources. If veterinarians are properly trained and equipped, they can not only make informed decisions about which antibiotics (if any) to use, but also document antibiotic sensitivity trends, resistance patterns, and disease outbreaks creating a critical evidence base to inform future policies and practices. A significant concern is the limited availability and adoption of biologicals, particularly live vaccines. For example, Infectious Laryngotracheitis (ILT)a serious respiratory disease currently has no approved live vaccine available in India. This gap compels producers to resort to antibiotics to manage secondary bacterial infections resulting from viral diseases like ILT, Mycoplasma etc.

4. **Limited Awareness and Education on AMR Risks:** A major challenge across the poultry sector is the inadequate understanding among farmers, veterinarians, and input suppliers about the drivers and impacts of AMR. Sharma et al. (2014), in a study conducted among poultry farmers in Assam and Karnataka, found that farmers' understanding of antibiotics, their use, and antimicrobial resistance

was limited. Although most farmers had heard of antibiotics, only a small percentage believed they were specifically meant to treat diseases. Many also believed that medicines must be included in feed or given to the entire flock if one bird fell ill. Such misconceptions highlight the urgent need for awareness and education across all levels. The issue also stems from limited inclusion of AMR-related content in veterinary science curricula, resulting in knowledge gaps regarding its long-term effects. Awareness and capacity-building initiatives need to be continuous and multi-tiered beginning in academic institutions and extending to producer groups, other value chain actors up to slaughterhouses.

5. **Over-the-Counter Sale and Misuse of Critically Important Antimicrobials:** Antibiotics are widely available without the need for a prescription. This unrestricted access leads to misuse, overdosing, and the inappropriate selection of antimicrobials including those categorized as "critically important for human medicine."

6. **Shortage of Poultry-Specific Veterinary Services:** India suffers from an acute shortage of qualified poultry veterinarians, particularly in rural and peri-urban districts where poultry farming is expanding rapidly. As a result, farmers are left to depend on paravets, feed dealers, or self-medication, none of whom are adequately trained in AMR-sensitive prescribing. As per the National Commission on Agriculture (1976), there should be one veterinarian for every 5,000 livestock for effective service delivery. However, as of 31 March 2023, India has only 81,938 veterinarians against an estimated requirement of 1.07 lakh, indicating a substantial shortfall in human resources. This inadequacy severely constrains the reach and quality of veterinary services available to farmers, especially in specialized areas such as poultry health management.

7. **Absence of Record-Keeping and Data Management Systems:** A major gap in the poultry sector is the absence of systematic record-keeping on antibiotic use, disease outbreaks, and treatment outcomes.

Most smallholder and unorganized farms lack proper documentation of veterinary interventions, making it difficult to track antimicrobial use and detect resistance trends. As highlighted in the *Study on Animal Health Improvement & AMR Reduction in the Indian Poultry Sector* (2021), there is no reliable data available about the antimicrobial volumes applied at the farm level. The lack of such data reduces the effectiveness of rules, regulations, and initiatives, as there is little incentive or mechanism for knowledge sharing among value chain stakeholders. This data gap poses a serious limitation for AMR reduction and hinders evidence-based decision-making and policy formulation.

8. **Economic Pressures and Absence of Incentives for AMR Reduction:** Thin profit margins in the poultry sector often disincentivize investment in disease prevention, biosecurity upgrades, or diagnostics. As reported by the FAO in *Poultry in the 21st Century* report, small commercial producers operate with very narrow profit margins and are unable to benefit from economies of scale or advanced technologies available to larger producers. In the absence of financial incentives, certification programs, or premium markets for antimicrobial-free poultry, shifting toward responsible antimicrobial use remains challenging.

9. **Challenges in the Backyard Poultry Segment:** Backyard poultry, though often seen as low-input and low-risk, presents unique AMR challenges due to complete absence of veterinary oversight, poor housing, and reliance on informal drug supply chains. Birds are often treated with leftover antibiotics, or through advice from unqualified personnel. Tailored interventions are needed to address the specific vulnerabilities of backyard poultry, including mobile veterinary services, decentralized training modules, and easy-to-use alternative therapies.

10. **Lack of Consumer Demand for AMR-Sensitive Poultry Products:** Unlike global markets where “antibiotic-free” labels fetch a premium

prize, Indian consumers remain largely unaware of the connection between AMR and poultry production. As a result, market forces do not push producers to adopt safer practices. Retailers and supermarkets too seldom differentiate products based on AMU status. Increased public education and demand-side awareness could play a transformative role in driving responsible production practices.

Antimicrobial Stewardship in the Poultry Sector

Need for Antimicrobial Stewardship in the Poultry Sector

With growing domestic consumption and export potential, AMR in poultry threatens both public health and economic stability, as resistant infections compromise treatment efficacy and antibiotic residues risk export rejections. The Scoping Report on Antimicrobial Resistance in India (Sumanth et al., 2017) underscored critical knowledge and research gaps, revealing that only 3.3% of AMR studies focused on animals, and very few explored farmers' knowledge, attitudes, and practices. This highlights the need for behavior-focused interventions and farmer-centric policies to address the root causes of antimicrobial misuse. The poultry industry also offers one of the strongest entry points for AMR stewardship. Its relatively organized structure, technological adaptability, and growing consumer awareness make it a strategic focus for interventions. Strengthening AMR surveillance, promoting biosecurity and good husbandry practices, and ensuring responsible antibiotic use can yield significant health, productivity, and trade-related benefits. A sector-led, science-based stewardship approach complemented by strong regulatory oversight will be essential to curb AMR emergence and ensure sustainable growth of India's poultry industry. Stewardship programs can curb misuse, strengthen biosecurity, promote vaccination and hygiene, and ensure veterinary supervision. This also align with India's National Action Plan on AMR (NAP-AMR) and its broader *Viksit Bharat* 2047 vision, helping to secure a healthier, more sustainable, and globally competitive poultry sector.

Advantages for India in Pursuing Poultry AMR Stewardship

While AMR presents serious challenges to public health and food systems, it also offers India a strategic opportunity to lead in sustainable and responsible poultry production. The global shift toward antibiotic-free and residue-compliant products is creating new domestic and export market opportunities. Rising consumer awareness especially in urban areas post-COVID-19has increased demand for food labelled as "antibiotic-free," "hormone-free," and "organic," enabling producers to capture premium markets. The growing market for alternatives to antibiotics, such as probiotics, prebiotics, vaccines, and herbal formulations, presents another area of innovation. Simultaneously, digital traceability and diagnostic solutions including mobile-enabled testing, IoT-based monitoring, and blockchain integration are transforming farm management and regulatory compliance. As global markets increasingly demand verified, antibiotic-responsible production, certification and labelling ecosystems are emerging as critical enablers of trust and market differentiation. Opportunities lie in establishing third-party certifications for "antibiotic-free," "AMR-responsible," and "residue-safe" production, along with retailer-driven labelling programs. Collaborative frameworks among private sector, NGOs, and regulators can help develop India-specific standards aligned with global benchmarks. Parallelly, green financing and investment flows are beginning to incorporate AMR risk into Environmental, Social, and Governance (ESG) frameworks. International lenders and impact investors increasingly prefer enterprises with traceable and compliant systems, offering capital advantages to companies that integrate AMR stewardship into their operations.

India holds a unique competitive advantage in this evolving ecosystem, supported by its rich base of herbal and ayurvedic veterinary products, strong IT and biotech capabilities for diagnostics and traceability, and extensive contract farming networks accessible through integrators and cooperatives. For Indian producers, AMR stewardship represents not only a compliance imperative but also a strategic differentiator driving premium pricing, trade resilience, investor confidence, and long-term sustainability.

CIIFACE's Role in Initiating Industry-Led AMR Stewardship

Recognizing the growing threat of AMR in animal agriculture, the Confederation of Indian Industry Food and Agriculture Centre of Excellence (CIIFACE) initiated a pioneering, industry-led effort to promote responsible antibiotic use across livestock systems. To build a comprehensive understanding of the issue, CIIFACE organized a series of focused multi-stakeholder consultations covering the poultry, dairy, and fisheries sectors — the three most critical domains of India's food system and major contributors to antibiotic use.

The consultations were designed to:

- Identify sector-specific drivers of antimicrobial use and associated challenges.
- Prioritize actionable solutions to reduce antibiotic dependency and strengthen stewardship.

Participation spanned the entire animal health ecosystem, including industry representatives, government and regulatory agencies, veterinary and fisheries professionals, academia and civil society, and startups and technology providers. These consultations enabled rich exchanges of experience and ideas on surveillance, record-keeping, capacity building, policy support, and technological enablers. The insights from these discussions were consolidated into a landmark report titled "Industry-led AMR Stewardship in Animal Agriculture". This initiative stands out as India's first industry-driven AMR stewardship effort. It empowered industry leaders to shape the agenda for responsible antimicrobial use ensuring that solutions were realistic, scalable, and aligned with business and public health goals. Building on the report's recommendations, CII-FACE launched the AMR Stewardship Drive 2025, in partnership with the Indian Federation of Animal Health Companies (INFAH) as Knowledge Partner. The campaign spans four zones North, South, East, and West targeting veterinary colleges and professionals to take stewardship principles to the grassroots. Through awareness sessions and capacity-building programs, the Drive aims to sensitize veterinarians, para-veterinarians, fisheries professionals, academicians and farmers on

prudent antibiotic use and sustainable animal health management. This campaign marks a significant step in translating national AMR strategies into ground-level action, turning awareness into accountability and collaboration into long-term stewardship.

Impact and Learnings from CII's AMR Stewardship Drive

The CIIFACE AMR Stewardship Drive 2025 has emerged as a milestone in advancing awareness, collaboration, and accountability within India's animal agriculture sector. Through focused engagements across Karnataka, Maharashtra, and Bihar, the initiative reached over 330 veterinarians, para-veterinarians, fisheries professionals, and students fostering discussions that combined scientific evidence with on-ground realities. Beyond awareness creation, the campaign catalyzed a shared understanding of the need for responsible antimicrobial use, documentation, and promotion of safe, sustainable alternatives like ethno veterinary medicine (EVM). Built strong regional networks of veterinarians, researchers, industry partners, & students to collectively act on AMR stewardship. The participation of industry leaders, academia, and veterinary colleges also ensured a strong pipeline for engaging the next generation of animal health professionals, who were encouraged to take stewardship forward through competitions and engaging with the professionals with vast learning experience in the field.

The key learnings from the AMR Stewardship Drive collectively highlighted the multifaceted approach needed to address AMR across India's poultry sector. Participants underscored the need to strengthen regulation and responsible antibiotic use, noting persistent gaps in field-level diagnostics and the widespread availability of over-the-counter antibiotics. Strengthening district-level diagnostic infrastructure, integrating surveillance networks with national AMR monitoring systems, and implementing digital traceability tools were identified as crucial. Ensuring compliance through prescription audits, withdrawal period monitoring, and residue testing at egg and meat collection points was seen as essential for transparency and consumer trust. Continuous awareness campaigns, inclusion of AMR and One Health modules in veterinary curricula, and innovative outreach such as the "Red Line Campaign" for

veterinary antibiotics similar to human medicine to discourage misuse and self-medication and student activities like "Be Antibiotic Smart: The Future is in Your Hands" were recognized as effective strategies to shape positive behavioural shifts. The consultations also emphasized strengthening veterinary practice and stewardship mechanisms through the institutionalization of Antimicrobial Stewardship Programmes (ASPs) in veterinary colleges, hospitals, and state veterinary departments. These programs would facilitate rational antibiotic use based on diagnostics and promote adherence to the "5Rs" — Right Indication, Right Drug, Right Dose, Right Duration, and Right Frequency. Participants advocated for empowering veterinarians to take informed, diagnostic-based decisions and establishing field-level stewardship committees and digital e-prescription systems to enhance accountability.

From a policy and institutional perspective, the Drive highlighted the urgent need for multi-sectoral coordination and One Health collaboration. Participants urged the development of State Action Plans (SAP-AMR) for regional accountability. Strengthened collaboration among the Ministries of Health, Animal Husbandry, Environment, and Food Safety was seen as essential, alongside voluntary industry efforts. Finally, surveillance, data management, and research innovations were identified as critical enablers for informed decision-making. Participants recommended leveraging digital monitoring tools, harmonizing laboratory standards, and connecting national labs with global databases like FAO Assessment Tool for Laboratories and Antimicrobial resistance Surveillance Systems (FAOATLASS) and WOAHANIMUSE (for Animal antimicrobial USE). Advancing research in probiotics, bacteriophages, and resistance-modifying herbal compounds was encouraged to restore antibiotic efficacy. At the farm level, improving biosecurity, waste management, and infection prevention through Good Animal Husbandry Practices (GAHP) including improved housing, hygiene, vaccination, proper disposal of litter and carcasses, and segregation of sick birds was recognized as fundamental to reducing AMR risks and ensuring sustainable livestock production. To promote responsible antimicrobial use and strengthen biosecurity, introducing a market-driven "Star Rating" system for poultry farms based on compliance with established animal

husbandry and hygiene standards was also recommended. Such a system would allow farms demonstrating higher biosecurity and responsible antibiotic practices to gain market differentiation and potentially command premium prices. However, the success of this approach would depend on building parallel consumer awareness and demand for responsibly raised, antibiotic-safe poultry products.

The Way Forward: AMR Stewardship towards *Viksit Bharat* 2047

Achieving the vision of *Viksit Bharat* 2047 requires India's agriculture and allied sectors to be globally competitive, sustainable, and health-resilient. In this transformation, AMR stewardship must become a central pillar of the national food systems strategy ensuring productivity, food safety, and One Health integrity. Poultry, as the most affordable and fast-growing source of animal protein, can lead this change by embracing responsible antimicrobial use, better farm practices, and innovation-driven growth.

Moving forward, a coordinated multi-stakeholder approach is essential:

- Farmers must be empowered as first responders in AMR stewardship through training, access to diagnostics, and adoption of bio secure, antibiotic-free production practices.
- Veterinarians and para-vets need to lead responsible antibiotic prescription and implement Antimicrobial Stewardship Programmes (ASPs) at institutional and field levels.
- Feed and drug manufacturers should reformulate products to exclude growth-promoting antimicrobials and promote validated alternatives like probiotics, herbal additives, and vaccines.
- Integrators, and processors can embed traceability, and residue checks within their supply chains, ensuring clean and certified products.
- Regulators and government agencies must strengthen surveillance, promote prescription-only antibiotic sales, and support R&D and digital traceability tools.
- Academia and research institutions should focus on validation of traditional remedies, resistance tracking, and innovations in diagnostics and alternative therapeutics.

- Industry bodies and NGOs can drive awareness, certification systems, and public–private partnerships for AMR-responsible production.
- Consumers play an indirect but powerful role through their demand for antimicrobial-free and safe animal-origin foods.

The target areas for action in the poultry sector should include strengthening enforcing prescription-based systems to ensure prudent antimicrobial use, diagnostic and residue testing infrastructure essential to enhance surveillance, ensure compliance, and maintain food safety. Parallel efforts should focus on improving vaccination coverage, farm hygiene, and biosecurity to lower disease burden and reduce antibiotic dependence. Promoting research on herbal, probiotic, and other non-antibiotic alternatives can further support preventive health management. In addition, establishing certification, labelling, and traceability systems will help build market trust and open new trade opportunities for AMR-responsible poultry products. Addressing the economic implications of AMR is equally critical, as rising resistance can lead to production losses, higher treatment costs, trade barriers, and declining consumer confidence, posing long-term risks to sustainability and productivity. Ultimately, fostering education, behavioral change, drawing learning from different sectors like shrimp farming and cross-sectoral collaboration under the One Health framework will be key to ensuring a resilient, competitive, and sustainable poultry value chain.By aligning AMR stewardship with sustainability, innovation, and food safety goals, India can transform its vast poultry sector into a global leader in responsible and resilient production systems, setting a benchmark for AMR mitigation worldwide and contributing to the vision of a One Health–aligned *Viksit Bharat* by 2047.

Disclaimer: *The views expressed in this article are those of the author alone and do not represent the views of the organization.*

References

References on request