



KEY MESSAGES

- This brief is important for policymakers, researchers, animal health service providers, and agricultural stakeholders in low- and middle-income countries.
- Crucial insights are provided into drivers of antimicrobial misuse in livestock and aquaculture, providing evidence-based recommendations for improving antimicrobial use practices.
- By understanding the gaps in diagnostic services, regulatory frameworks, and farmers' education, stakeholders can design targeted interventions to promote responsible antimicrobial use.
- Strengthening regulatory frameworks in these areas will help mitigate antimicrobial resistance, protect animal and human health, and ensure that the animal and aquatic food sector can move toward more sustainable, antibiotic-free production systems in low- and middle-income countries.

FIVE KEY TAKEAWAYS ON THE IRRATIONAL USE OF ANTIMICROBIALS IN LIVESTOCK AND AQUACULTURE SYSTEMS IN LOW- AND MIDDLE-INCOME COUNTRIES

OVERVIEW

Antimicrobial resistance (AMR) is a growing concern, and is exacerbated by the misuse and overuse of antimicrobials in humans and agriculture. Strengthening regulatory frameworks and promoting responsible antimicrobial use (AMU) are essential to addressing this issue. In many low- and middle-income countries (LMICs), antimicrobials are often more affordable than diagnostic services or veterinary care, hence farmers rely on them as quick solutions to production and health issues. Farmers may also be unaware that the products they use contain antibiotics, sometimes up to four different types, and may not fully understand the long-term risks associated with antimicrobial overuse.

The CGIAR One Health initiative is at the forefront of tackling these challenges through research and advocacy, and by providing evidence-based information for targeted interventions and policies. Irrational antimicrobial use in livestock and aquatic systems is a critical driver of AMR, and farmers often bypass disease diagnosis, resorting to over-the-counter antibiotics, which further exacerbates overuse or misuse. Expanding access to animal health services, affordable diagnostics, improving biosecurity measures, and integrating gender-responsive approaches are critical for reducing reliance



on antimicrobials and ensuring sustainable livestock and aquaculture systems. This brief highlights five key insights from the CGIAR One Health initiative working on addressing the irrational use of antimicrobials in livestock production and aquaculture.

Takeaway 1: Strengthening regulatory frameworks can reduce misuse and overuse of antimicrobials in agriculture including restricting the use of critically important drugs for human health to preserve their efficacy.

CGIAR contribution: CGIAR scientists are tackling these challenges through comprehensive research, advocacy, and capacity building to promote the responsible use of antimicrobials in livestock and aquaculture. In Malawi, scientists mapped the veterinary antibiotic distribution chain, revealing both formal and informal drug distribution networks (Figure 1). Moreover, significant gaps in regulatory oversight were identified, including improper handling of antibiotics and inadequate training for agrovet staff. Similarly, in Kenya, an analysis of the veterinary antibiotic supply chain uncovered challenges such as over-the-counter antibiotic sales without prescriptions, and counterfeit products. These issues are compounded by limited financial and human resources. To address these deficiencies, the CGIAR are advocating for better coordination between regulatory agencies, supporting policy reform, and promoting the creation of business models aligned with antimicrobial stewardship. The CGIAR aims to reduce antimicrobial misuse and promote sustainable practices by strengthening governance and regulatory frameworks.

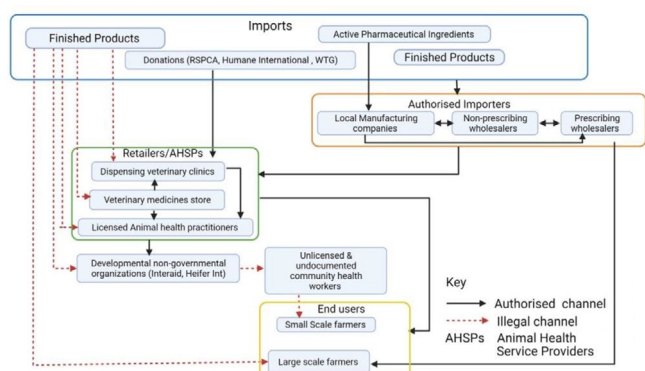


Figure 1: The flow of veterinary antibiotics in Malawi.

Takeaway 2: The low cost and easy accessibility of antimicrobials, combined with their perceived benefits for disease prevention and treatment, make them highly appealing to farmers.

CGIAR contribution: A study was undertaken of poultry production in Kenya to better understand farmers' access to antimicrobials and the patterns of antimicrobial use in

poultry production. In a study of semi-intensive broiler production, more than 70% of farmers reported using antibiotics. Two-thirds reported that the primary reason for their use was prophylaxis (66%), with only 19% of farmers indicating their use for therapy alone (Figure 2).

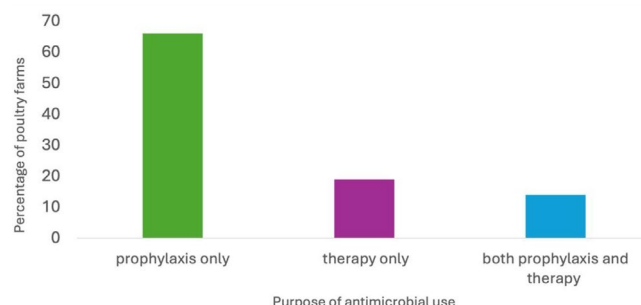


Figure 2: The proportion of semi-intensive poultry farms in Kenya using antimicrobials for different purposes.

Although antibiotics are generally cheap, they account for less than 1% of the total production cost (Figure 3). Feed is the most significant expense, accounting for most of the overall cost (70%). Other inputs like antibiotic vitamins and vaccines represent a much smaller portion of the total expenses (3.4%). This indicates that while antibiotics and health-related inputs are relatively affordable, feed costs heavily dominate production expenses. Therefore, strategies focused on reducing feed costs could have the greatest impact on improving profitability for poultry farmers.

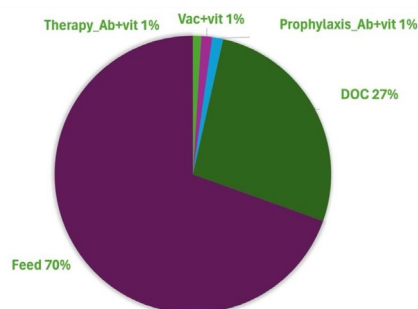


Figure 3: Distribution of production costs in semi-intensive poultry farming in Kenya.

Takeaway 3: Enhanced training on responsible antibiotic use and biosecurity practices could significantly reduce reliance on antibiotics, supporting Bangladesh's efforts to combat AMR in aquaculture.

CGIAR contribution: In Bangladesh, CGIAR researchers conducted studies in tilapia fish farms and agrovet shops to assess the antibiotic use and the behavioral factors influencing decision making such as knowledge, awareness, and practices. The findings revealed that most antibiotics sold for aquaculture were off-label and dispensed without



veterinary prescriptions. Critically important antibiotics (CIAs) and highly important antibiotics (HIAs) for human medicine, as classified by the World Health Organisation (WHO), were commonly used. Among 116 tilapia farms surveyed in Mymensingh, a key fish-producing region, only 14.7% of farms reported using antibiotics in their last production cycle; thirteen different antibiotic brands were identified and all categorized as CIAs or HIAs. Oxytetracycline was the most frequently used, followed by enrofloxacin and a combined erythromycin-sulphadiazine-trimethoprim drug.

Half of the respondent’s believed antibiotics were suitable to treat fish diseases, while 11% and 37% of the respondents perceived that antibiotics could be used for disease prevention and for other reasons, respectively (Figure 4). Alarminglly, 56% of respondents were unaware of any risks associated with antibiotic use. And among the famers who were aware of the risks, only one farmer (1.96%) recognized the connection between antibiotic use and AMR (Figure 5).

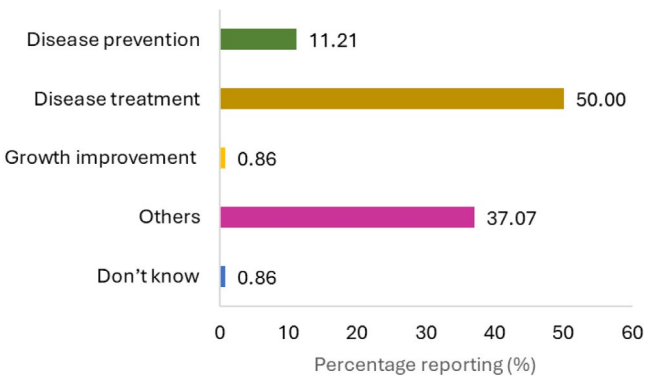


Figure 4: Purpose of using antibiotics in fish production as perceived by farmers in Bangladesh (unpublished).

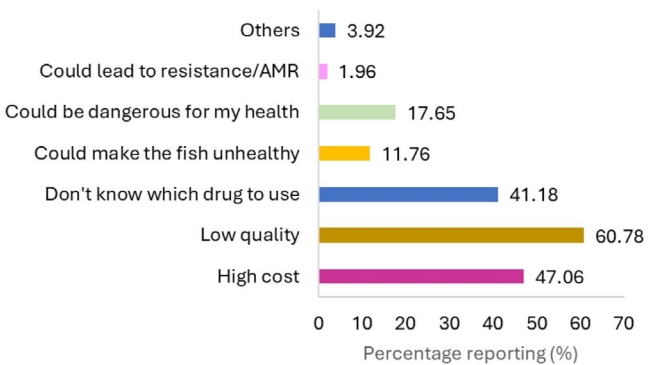


Figure 5: Downsides of antibiotic use in fish production as perceived by fish farmers in Bangladesh (Unpublished).

The study also found significant gaps in biosecurity practices, with 98% of farmers reporting they did not implement basic infection control measures, such as disinfection of vehicles, equipment, or footwear to prevent

disease spread. These findings highlight critical knowledge gaps in biosecurity and antimicrobial stewardship. Providing training on biosecurity and responsible antibiotic use could significantly reduce antibiotic reliance in aquaculture, aligning with Bangladesh’s National Action Plan for AMR containment.

Takeaway 4: Reducing irrational antimicrobial use by addressing veterinary diagnostic service gaps.

CGIAR contribution: From a review of veterinary diagnostic laboratory capacities in Kenya, it is evident that the lack of access to timely, accurate, and affordable diagnostic services is a significant factor contributing to irrational AMU. Challenges such as the high cost of diagnostics, long turnaround times, and logistical barriers – combined with a lack of awareness among farmers and animal health service providers (AHSPs) – result in the underutilization of diagnostic services. Many farmers and AHSPs are either unaware of the available diagnostic services or perceive them as too costly and inconvenient. This leads to widespread reliance on self-treatment with antimicrobials and contributes to misuse and overuse. Addressing these challenges through scaling-up accessible, rapid, and affordable diagnostic services – coupled with farmer education and awareness initiatives – is critical for promoting evidence-based AMU, mitigating AMR, and improving livestock health outcomes.



Figure 6: A rapid, point-of-care test to aid antibiotic treatment decision making for mastitis in dairy cows, which can help reduce unnecessary use of antibiotics.

Lastly, scientists piloted an innovative on-farm diagnostic test for mastitis (Figure 6) to demonstrate that accessible, rapid diagnostics is feasible in a low-resource setting. Furthermore, it has the potential to improve treatment decisions and reduce irrational AMU. Scaling up of such initiatives would transform livestock health management by reducing reliance on antibiotics for disease prevention and treatment. The integration of diagnostic services into AMU interventions, coupled with training for farmers and AHSPs, is crucial for promoting evidence-based AMU

decisions. Expanding access to affordable and reliable diagnostic services is essential to reducing AMU in agri-food systems in LMICs.

Takeaway 5: Reducing AMU in agri-food systems requires a gender-responsive approach that acknowledges the distinct roles, decision-making powers, and access to resources among men and women in farming households.

CGIAR contribution: The Gender and AMR in Livestock Research Framework developed by ILRI and the Global Strategy Lab at York University, Canada highlights the critical need to integrate gender considerations into AMR research in livestock systems to address irrational AMU. Gender norms significantly influence who has access to veterinary resources, information, and decision-making power regarding the use of antimicrobials (Figure 7). These challenges contribute to the irrational use of antimicrobials in livestock systems.

By using this research framework, researchers can identify key entry points for addressing the gendered impacts of AMR, ensuring that interventions are inclusive, effective, and responsive to the needs of all household members. Integrating gender considerations into AMU interventions enables the development of more equitable and sustainable policies, ensuring that both men and women have access to the necessary tools, resources, and knowledge for responsible antimicrobial stewardship. This framework is essential for addressing gender disparities, reducing AMU, and promoting more equitable outcomes in livestock management systems, which will ultimately contribute to the fight against AMR while enhancing the overall sustainability of livestock practices.

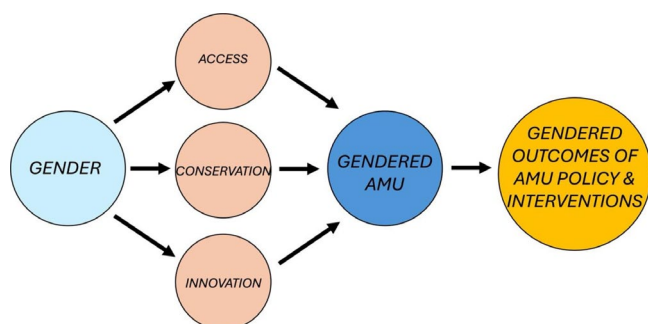


Figure 7: The relationship between gender and AMU outcomes.

FUTURE PERSPECTIVES

The work undertaken by the CGIAR will continue under the new Sustainable Animal and Aquatic Food systems program, maintaining focus on targeted innovations and incentives to reduce AMU and mitigate AMR risks at the farm-level and integrating learnings from the One Health initiative. Pilot interventions will be tested including gender sensitive strategies and economic analyses to support context-appropriate policies and incentives for behavior change. These efforts will be essential for strengthening regulatory frameworks and ensuring responsible antimicrobial stewardship.

Looking ahead, and aligning with the outcomes of the 2024 Political Declaration of the High-level Meeting on AMR at the United Nations General Assembly, there is a need to design agri-food systems that reduces reliance on antibiotics by improving overall livestock and fish management practices. This includes optimizing feed resources, improving animal welfare, and integrating innovative technologies to monitor health and productivity. By addressing all these areas, the animal and aquatic food sector can move toward more sustainable, antibiotic-free production systems.

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