ARE Responsible Protein Business Case Series:

Antimicrobial Resistance and Responsible Antibiotic Use, India Focus

Summary:

- Indian exports in seafood, poultry, and pharma face growing scrutiny and rejections due to antibiotic residues, threatening food safety, market access, and brand reputation.
- Food Safety and Standards Authority of India's 2024 standards (effective April 2025) mandate residue-free certification and full traceability across animal-origin foods, possibly raising compliance expectations and costs.
- Global investors managing more than USD15 trillion now view Antimicrobial Resistance (AMR) as a material ESG risk, demanding clear stewardship commitments, responsible sourcing, and antibiotic reduction targets.
- Responsible antibiotic use and AMR are now key topics in trade negotiations, including the upcoming EU–India Free Trade Agreement, linking antimicrobial stewardship to future export opportunities and regulatory alignment.
- Companies failing to act risk food safety, stranded assets, and lost capital access, while first movers can lead on responsible supply chains, reduce long-term costs, and build brand trust.

This case is related to other Business Cases in the Series including themes:

Climate, Nature, Animal Welfare

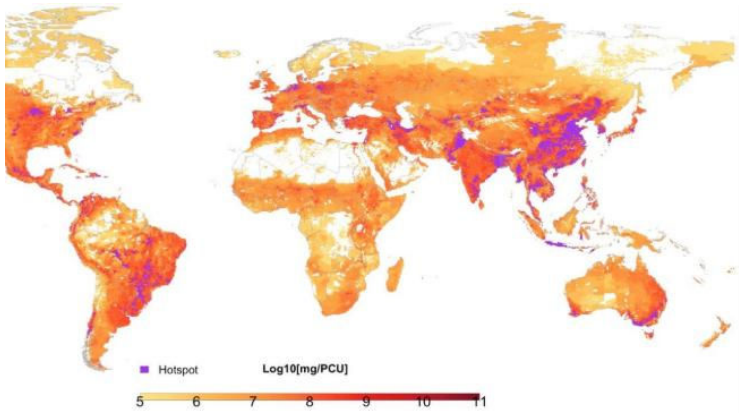
What is Antimicrobial Resistance, Antibiotic Overuse, Residues, and Resistance

AMR — the ability of bacteria, viruses, fungi, and parasites to withstand antimicrobial drugs — has been declared a top global health priority by the World Health Organization (WHO).[1] AMR emerges naturally, but its spread is **accelerated by the overuse and misuse of antibiotics** across human health, animal production, and the environment.

In the food sector, antibiotics are frequently used not only for treating sick animals but also for **growth promotion** and **routine disease prevention**. The two non-treatment practices drive AMR by enabling resistant bacteria to thrive. In addition, antibiotic **residues** — trace amounts of these drugs or their by-products left in animal-derived foods — can also exceed safety limits and contribute to the spread of resistance in both humans and animals.

The **distinction is critical**: **antibiotic overuse** increases the risk of **antibiotic residues** and fuels the emergence of **resistant pathogens**. Both can provide **direct contamination risks in food**, with animal-based foods at highest risk to workers, consumers, and trading partners.

Recognising these interconnected risks, global investors increasingly expect companies in animal protein supply chains to commit to: (1) **Prohibiting antibiotic use for growth promotion; (2) Reducing or eliminating prophylactic use in healthy animals; and (3) Strengthening animal husbandry and welfare outcomes to reduce disease risk and antibiotic need for treatment.**



Antimicrobial Use in Livestock across the Globe, Antimicrobial use per mass livestock. Purple indicates hotspots: majority in Asia, Source: Mulchandani et al, 2023[2]

According to a UN report, AMR-related illness and death could reduce global economic output by 1–3% by 2030, amounting to USD3.4 trillion in potential losses. With almost **10% of global equity markets — about USD14.6 trillion — exposed to AMR-related risks**[3], investors are increasingly framing AMR and antibiotic stewardship as public health and nature-related financial risks.

There is growing recognition that AMR is not solely a human health issue but a systemic risk interconnected with biodiversity loss, ecosystem disruption, and the resilience of food systems.[4] Many **investor-led initiatives and global policy frameworks** such as the **FAIRR Initiative's Antibiotics Stewardship Engagement**[5], the **Access to Medicine Foundation's AMR Benchmark**[6], and the **Principles for Responsible Investment (PRI)**[7] are encouraging companies to set interim antibiotic-reduction targets well before 2030 as a stepping-stone toward full alignment. Investors working with the Asia Protein Transition Platform urge commitment as soon as possible.

Why This Matters: A Business Risk, Not Just a Health Crisis

World Bank estimates suggest AMR could shrink global GDP by 2–3.5% by 2050, cut livestock output by 3–8%, and cause economic losses up to USD100 trillion.[8] AMR is no longer just a public health concern; it's a material business and ESG risk with direct implications for **food safety, export competitiveness, supply chain reliability, regulatory compliance, and investor confidence.**

For example, in India, sectors like **seafood, poultry, dairy, and pharmaceuticals** face intensifying scrutiny after shipment/trade rejections. Tightening standards — such as the **Food Safety and Standards Authority of India's (FSSAI) 2024 antibiotic residue**

norms[9] and the **European Union's (EU) 2026 import conditions**[10] — signal a new baseline for responsible antibiotic use. Meanwhile, **global buyers and sustainability-linked financiers** are now embedding AMR management into sourcing criteria and capital allocation.

Climate change and antimicrobial resistance are interconnected but often addressed separately. Intensive animal farming, land-use change, and deforestation drive both greenhouse gas emissions and the rise of AMR. Climate change disrupts farming systems and can increase antimicrobial use, accelerating AMR. In turn, AMR in food systems via manure and antibiotic overuse worsens climate impacts, producing higher emissions and resource degradation.[11]

While companies increasingly recognise climate change as a double material risk of priority, most remain blind to the growing threat and double materiality of AMR. Companies that fail to act now face real financial consequences: **market exclusion, brand damage, food safety, reputational and regulatory costs, and reduced access to capital**. Early movers that adopt robust stewardship and align with international standards stand to build resilience, strengthen reputation, and secure investor trust in an evolving global market.

AMR in India: The Converging Crisis

India is among the world's largest consumers and producers of antibiotics, for both human health and food production. This has led to the country becoming a global hotspot for AMR, which already contributes to an estimated **600,000 deaths annually in the country[12].**

India's AMR challenge stems from a web of interlinked vulnerabilities:

- **Antibiotic use spans healthcare, livestock, aquaculture, and pharmaceutical** manufacturing. Global consumption of antibiotics was estimated at approximately 99,500 tonnes in 2020[13], while India's share—based on INFAH estimates—is about 998 tonnes[14] (roughly 1% of global use despite holding 20% of the world's livestock). While this is relatively low in aggregate, pockets of intensive production (particularly poultry and aquaculture) remain vulnerable to misuse.

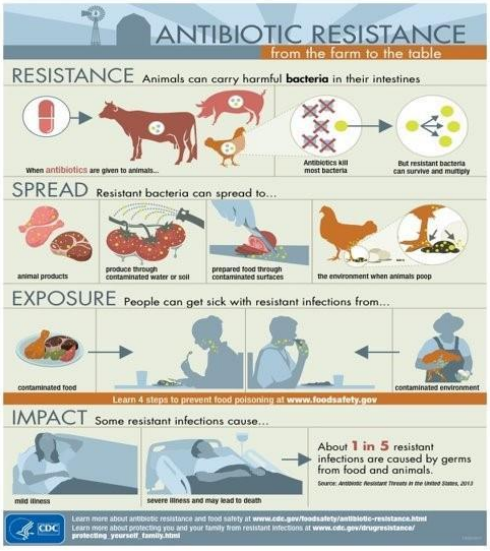
Growth Promotant use in India (2018). Source: AMR investigative report in urban water (2019)[15]

Excessive antibiotic use with low welfare,
Source: Peri / Urban Dairies (India, WAP 2018)

- **Intensive animal farming systems** with stressed animals prop up poor animal husbandry and animal welfare, driving high antibiotic use and amplifying exposure of workers and their families.
- **Inadequate effluent treatment** in pharmaceutical facilities and hospitals leads to the release of Active Pharmaceutical Ingredients (APIs) into surrounding ecosystems. Hyderabad's API hubs have faced scrutiny since 2017 for discharges containing **antibiotic residues, heavy metals, and solvents**.[16] Recent reports by **Toxics Link** found rivers like the Yamuna (Delhi), Zuari (Goa), and Cooum (Chennai) contaminated with antibiotic pollutants far exceeding safe thresholds.[17]
- **Environmental contamination** creates reservoirs of resistant bacteria in water and soil (also air, fish, and wildlife), amplifying AMR's impact on both food safety and public health.[18]
- **Weak enforcement and export-driven regulation** remain key challenges in India's antibiotic governance. While there have been proactive steps such as updating banned substances and residue limits, implementation is inconsistent and compliance by industry players is uneven. Regulatory action is often reactive, driven by export rejections rather than preventive domestic oversight, highlighting the need for stronger monitoring and accountability mechanisms. Antibiotic growth promoters are still allowed in animal feed in India, out of step with most other Asian markets. Even critically important antimicrobials are used as feed additives or supplements for feed.[19]

The **pharmaceutical sector,** worth **USD50 billion (FY 2023–24)**[20], drives India's prominence in global generics but is also under growing pressure to address its AMR footprint. According to the **Access to Medicine Foundation's 2021 AMR Benchmark**[21], companies in India such as **Viatris Inc, Aurobindo Pharma Ltd, and Abbott Laboratories** are among the generic manufacturers that have advanced responsible manufacturing practices — such as setting discharge limits and improving wastewater treatment — as part of their environmental stewardship policies to address AMR risk.[22]

The **use of antibiotics in animal water and feed** in India is widespread, cheap, and projected to increase by **82% by 2030**, with poultry meat consumption expected to **triple**.[23] A 2023 study of poultry farms in Punjab revealed that **87% used antibiotics**, and **39% reported using critically important drugs** like colistin, which were theoretically banned in 2019[24]. **Multidrug-resistant E. coli** was detected in 87% of sampled chicken, signalling widespread resistance risks.[25]



AMR Risks in the Food Chain, Source: CDC

In **aquaculture**, India is the **world's second-largest shrimp exporter,** supplying major markets such as the U.S., EU, Japan, and China.[26] Even so, it has faced multiple export rejections from the U.S. and EU over banned antibiotic residues:

- In 2023, **Milesh Marine Exports Pvt. Ltd.** and **Cochin Frozen Food Exports** were placed on the U.S. FDA's Import Alert for shipments contaminated with nitrofurans and veterinary drug residues.[27]
- In 2015, **Sharat Industries** and **Sandhya Aqua Exports** had similar rejections, undermining trust in Indian shrimp exports.[28]

Responding to such pressures, companies like **Kings Infra Ventures**[29] and **Penver Products** have partnered with evolving global certifiers to implement responsible antibiotic-use aquaculture and earn basic **certifications to demonstrate initiative.**[30] Others, including **Licious and FreshToHome**, are also promoting antibiotic residue-free meat in response to rising demand from health-conscious consumers[31] (a trend explored in detail later in this document). Residue-free, however, is a fundamental regulatory requirement and consumer expectation.

AMR is a textbook **One Health** crisis. A lack of clear identification of AMR's drivers and risk pathways hampers resolution efforts. As a result, high antibiotic use in animals, humans, and crops continues, with residues and resistant microbes cycling through water, soil, air, and food systems, spreading across sectors and borders. These systemic vulnerabilities now

amplify the exposure of India's **seafood, poultry, dairy, and pharma industries** to rising **trade barriers, reputational backlash,** disrupted **export volumes,** tighter **regulatory scrutiny,** and increasing **costs of compliance and surveillance. Climate change has also been shown to amplify AMR risks.**

The convergence of these risks makes AMR both a health emergency and a profound business, supply chain, and investor challenge. India's **high out-of-pocket health expenditure** (62.7% of total spend[32]), coupled with high AMR prevalence, means the economic shock for the country could surpass global projections in both scale and severity.

Material Risks for Companies and Investors

For Companies (in India)

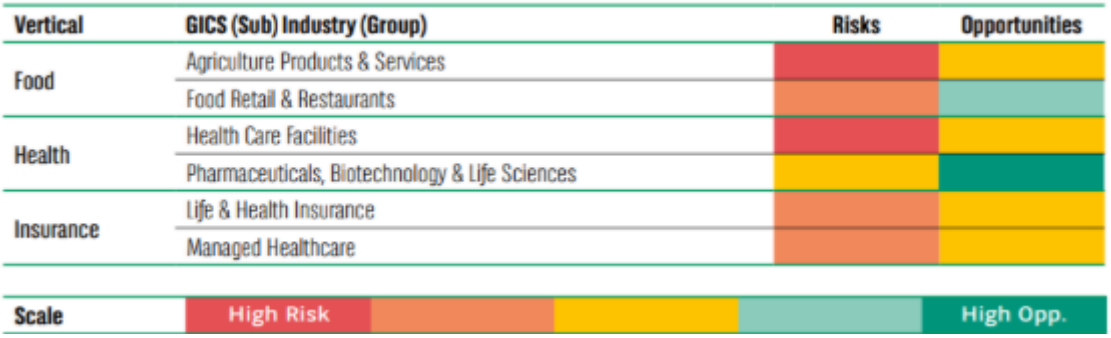
1. **Export bans and market access losses**
    a. The **Ministry of Commerce & Industry's mid-2025 ban on certain antibiotics in aquaculture**[33] followed multiple export rejections by the EU and U.S. due to antibiotic residues.
    b. Between 2003 and 2014, the EU issued **228 Rapid Alert System (RASFF) notifications** for Indian shrimp, with roughly 76% linked to antibiotic residues — threatening exporters' credibility and access.[34]
2. **Compliance and testing costs**
    a. Producers must now invest in **testing infrastructure, traceability systems**, pre-export certifications, and facility upgrades to meet **FSSAI's 2024 residue norms**[35] and **EU's 2026 antibiotic-free import requirements**.[36]
    b. **While EU non-compliance rates for veterinary drug residues remain low (~0.11% in 2023), according to the European Food Safety Authority,** companies that fail to invest in advanced testing and traceability systems risk costly recalls, fines, and shipment rejections.[37]
3. **Supply chain disruptions and recalls**
    a. Antibiotic-related refusals make up **~29% of all FDA shrimp import rejections**, directly impacting volumes and incurring logistical costs.[38]
    b. These disruptions can trigger delays, increased insurance premiums, and pressure on procurement for food suppliers and restaurants.
4. **Reputational and regulatory risk**
    a. Producers using last-resort antibiotics (for example, colistin) — such as **Venky's** in poultry — have faced public backlash, negative media coverage, and escalating investor scrutiny.[39]
    b. Pharma firms face similar risks from effluent discharges, with unresolved pollution in Hyderabad's API hubs sparking community backlash and regulatory scrutiny.

Most of the above actions focus on residues. None of them target and resolve the underlying causes of high antibiotic use. A greater identification and acknowledgement of the key drivers

of this crisis, a preventative mindset, and a resolution to the systemic causes are required. Food businesses have a unique supply chain opportunity to help identify, engage, resolve, limit, and monitor antibiotic use in future.

For Investors

1. **Portfolio misalignment and stranded asset risk**
    a. Investors with holdings in poultry, seafood, pharma, or agriculture exposure face potential **asset write-downs** if companies fail to meet tightening AMR regulations or lose market access.
    b. Roughly 12% of India's Enterprise Value (EVIC) is exposed to AMR-related risks, with USD400 billion in high-risk sectors like food, pharma, and agriculture.[40] WHO/World Bank also estimate livestock output could decline 3–8% by 2050 due to AMR.[41]
2. **Reputational risk and ESG underperformance**
    a. Global investor coalitions such as **FAIRR Antibiotics Stewardship Engagement** (representing USD15.2 trillion in assets) are now classifying AMR non-compliance as a material ESG threat.[42]
    b. Passive investors in companies lacking antibiotic stewardship may face pressure from civil society and markets for enabling poor practices when trade rejections hit.
3. **Regulatory and due diligence costs**
    a. As AMR gets integrated into sustainability-linked financing and investor engagement frameworks, portfolios tied to non-compliant firms could see **higher capital costs** or **exclusion from ESG-linked capital**.



Industrial risks and opportunities associated with AMR across sectors
Source: The Consequences of Antimicrobial Resistance for Investors, Nov2024 (based on "Health & Wealth: An Investor's Guide to Antimicrobial Resistance" (August 2024))

The MSCI Sustainability Institute (2024) reports that USD400 billion of Indian enterprise value is concentrated in high-risk GICS sub-industries, including agricultural products, packaged foods and meats, food retail, restaurants, healthcare, insurance, pharmaceuticals, and biotechnology. These sectors are particularly vulnerable to AMR-related disruptions and the figures underscore the growing financial materiality of AMR risks in the Indian context.[43]

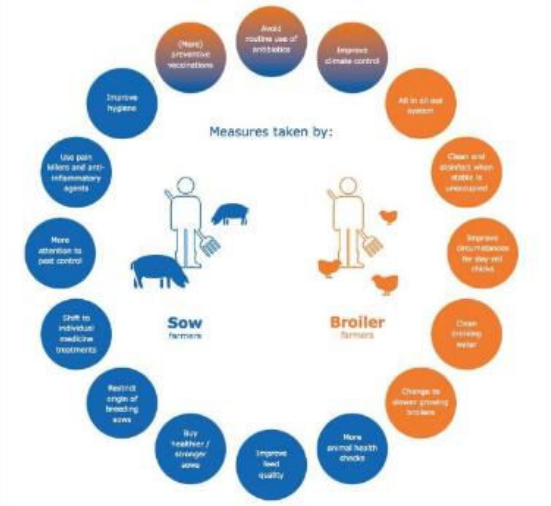
Opportunity Landscape: Turning Challenges into Value

It is too easy to point to policy failings and challenges. While there are no national schemes for monitoring and reporting antibiotic use reduction or AMR prevalence in Asia, there are significant actions companies can take. The crisis creates tangible **strategic opportunities** for forward-thinking companies and investors.

1. **Premium Demand for Traceable Products, Reduced Antibiotic Use, and High Meat Safety**
   - Indian consumers are growing more health-conscious: a **2024 survey** found 73% prioritise wellness[44] when purchasing food and beverages; 60% are open to cultivated meat that does not require antibiotic use; 46% would pay more for such products.[45]
   - Companies investing in certified, traceable production position themselves favourably for export growth and domestic differentiation.
   - **Responsible antibiotic use and strong animal welfare practices** are emerging as essential solutions to meet growing consumer expectations and build resilient protein/food systems. Recognising this, the FAO highlights **animal health and welfare** and **food safety** as two of the four foundational pillars for aquaculture certification standards. In response, Indian exporters are increasingly adopting **certification[46] and traceability systems** to align with global market demand for antibiotic residue–free products. In contrast, labels like **'Raised Without Antibiotics' (RWA)**, popular in the U.S. and parts of Asia, are facing criticism for discouraging treatment of sick animals and potentially misleading consumers. A recent study by 500+ American vets and farmers raised concerns about **compromised welfare, higher costs, and limited benefits**.[47]
   - Several European nations are leading in antibiotic use reduction, with national targets, regulatory use, and reporting requirements driving systemic reduction. Europe also requires imports to be free of antibiotic use for growth promotion, while EU operations must also reduce prophylactic use in farm animal production, including aquaculture.
2. **Resilient, Higher Welfare Production Systems**
   - According to the **World Federation for Animals**, improving animal welfare can significantly **reduce antimicrobial use** and underscores the need to develop **health-oriented rearing systems**.[48] Studies show a strong link between better welfare and lower antibiotic use[49], with improved animal health directly supporting efforts to curb resistance. Stress-reducing measures such as avoiding crowding, restraint, early weaning, and poor housing conditions are key to this approach. Enhanced welfare not only benefits animals but also promotes responsible antimicrobial practices.
   - **Farming nation success stories** (for example, Denmark, the Netherlands, Sweden, Norway, and others) show that well-managed farms can thrive with **very low antibiotic use**.

A systematic review and meta-analysis[50] comparing Blanket vs. Selective Dry Cow Treatment (SDCT) for managing intramammary infections during the dry period concludes that SDCT could significantly reduce antimicrobial use at dry-off in dairy cows. Decision Tree approaches for SDCT are now considered best practice by EuroDairy.[51]

A case from the **Netherland**s' broiler chicken sector shows how shifting to slower-growing broilers significantly cut veterinary antibiotic use as well as increased the overall productivity with lower mortality.[52]
Higher welfare and lower AMU – actions, positive reinforcement in the Netherlands as shown in the image.



Use of antimicrobials in aquaculture in **Norway** fell by 99 percent between 1987 and 2013, despite the industry's output growing more than 20-fold over that time. This was achieved through stricter regulatory oversight of antimicrobial use, combined with increased vaccinations and strong stewardship practices. Denmark's phased ban on antibiotic growth promoters since 1995, paired with surveillance (DANMAP), led to a 51% reduction in antibiotic use in pigs and 90% in poultry, while pork production rose 47%, making it a top global exporter. Demonstrating **high welfare and reduced antibiotic use can go hand-in-hand with commercial success**. Studies in the U.S., Denmark, and Sweden since the turn of the century show that growth promoters had less effect on animal growth rate and feed efficiency than they had done in earlier decades.[53] There are many more poultry, pig, and dairy sector-specific examples of this.

- **Leading Asian policies** such as the **Animal Welfare Policy[54] of China Mengniu Dairy** align towards international best practice, recognising the link between good dairy welfare, reduced antibiotic use, and antimicrobial resistance. It prohibits the use of antibiotics for growth promotion (as per China's requirement), the reduction of routine prophylaxis, and incorporates specific standards to strengthen the physical, environmental, and psychological well-being of dairy animals in their supply chains. The policy mandates responsible antibiotic use, bans tethering, and requires regular training and continuous improvement. Mengniu's approach reflects a broader shift in Asian agribusiness toward science-based, sustainable animal welfare practices.
  - Adopting these systems in poultry, dairy, and aquaculture can minimise input costs (meds, vets), increase yield quality, product safety, and ease compliance burdens.

3. **Investor & Sustainable Finance Momentum**
    - Leading global investors are now treating antibiotic stewardship as a material ESG and biodiversity risk. For example, the **FAIRR Antibiotics Stewardship Engagement, backed by 74 investors with more than USD5.5 trillion in assets,** directly engages food companies on reducing antibiotic use across protein supply chains. Furthermore, PRI, FAIRR, MSCI Sustainability Institute, and Investor Action on AMR have jointly produced guides urging investors to incorporate AMR due diligence into their capital deployment strategies across the food, agriculture, and pharma sectors.
    - Joint investor guides, such as *Health and Wealth: The Investors' Guide to AMR*[55], reinforce the case for linking AMR action to long-term value creation and resilience.
    - Though precedents in India are few, **sustainability-linked loans** could soon reward companies meeting reduced antibiotic-use KPIs under India's NAP-AMR Phase 2 objectives.
4. **First-Mover Advantage & Policy Alignment**
    - Companies that take early action on antibiotic stewardship and One Health positioning can establish:
        - **Stronger brand reputation;** attracting eco-conscious consumers and institutional capital but more importantly reassuring the mainstream market of food safety and quality.
        - **Regulatory resilience;** staying ahead of tightening requirements (FSSAI, EU).
        - **Operational advantages**, including export certainty and cost-effective compliance.
    - Unlike reactive firms, first movers can differentiate themselves through clear policies and transparent stewardship frameworks aligned with both domestic and global expectations.

Policy Signals Companies Can't Ignore

A rapidly evolving policy landscape — within India and globally — makes AMR compliance a strategic priority for food, pharma, and investor interests, visible in prioritisation of AMR in the 2023 G20 Delhi Declaration. **Key signals** companies must heed:

- **India's NAP-AMR (Phase II):** The upcoming **National Action Plan on AMR (2.0)** centres on One Health, with sectoral targets for antimicrobial use reduction, better infection control, and stewardship investment. Early adopters of these practices will gain a compliance edge and build trust with regulators, investors, and trade partners.[56]
- **FSSAI's 2024 Standards: A Domestic Gamechanger:** The **Food Safety and Standards Authority of India (FSSAI)** has banned specific antibiotics at **all production stages** (not just final processing) across milk, meat, eggs, poultry, and aquaculture, effective **April 2025**[57]. Producers must now show residue-free certification and full traceability — an investment-heavy yet partial move to retain

domestic and export market access. Though driven by recent export restrictions, this marks a significant step toward aligning domestic standards with international expectations, requiring substantial investment from producers.

- **EU Regulations Impacting Indian Exports:** The EU has moved beyond domestic bans. From **September 2026**, it will require Indian animal product exporters to **certify** for a ban on antimicrobial use for growth promotion and prohibit antimicrobials reserved for human medicine. Non-compliance risks **market exclusion**, costly rejections, reputation and brand damage, especially in shrimp, poultry, and dairy.
- **Global and NGO Pressure for One Health Action:** Global agencies, the Quadripartite – WHO, FAO, United Nations Environment Programme, World Organisation for Animal Health (WOAH) – alongside Indian civil society (ReAct Asia Pacific, CSE) are intensifying calls to eliminate routine antibiotic use. WHO Guidelines on Use of Medically Important Antimicrobials in Food-Producing Animals (2017) already push for bans on growth-promotion and group prophylactic antibiotics.
  The FAO's Draft Resolution, "Addressing Antimicrobial Resistance in Agrifood Systems," calls for a global reduction in antimicrobial use by 2030. It emphasises investments in animal and plant health to prevent infections, reduce inappropriate antimicrobial use, and advance stewardship and regulatory reforms. It positions AMR as central to sustainable agrifood system transformation, while fostering financial resource mobilisation, private-sector engagement, and strengthened antimicrobial stewardship.
- **AMR in Trade Negotiations**
  AMR and food safety are now central to free trade agreements, including the ongoing EU-India FTA negotiations. The proposed text emphasises Sustainable Food systems,[58] with cooperation on reducing food fraud, food loss, pesticide and antimicrobial use, and improving animal welfare. Notably, both parties commit to phasing out antibiotics as growth promoters — and making strong stewardship practices vital for Indian exporters to maintain and expand market access.

Companies Should:

- **Create and Publish Policies:** Develop and publicly disclose a formal, company-wide policy on responsible antibiotic use, aligned with international guidelines (WHO, WOAH, FAO). In short, this should include:
  1. Prohibiting any antibiotics used for growth promotion.
  2. Reduction or avoidance of any antibiotics for routine group prophylaxis.
  3. Basic plan/opportunities to resolve underlying risks of animal husbandry and strengthen animal welfare etc.
- **Promote Responsible Systems, Use and Stewardship: Preserve antibiotics for treatment of sick animals only.** Phase out the routine or blanket use of antibiotics for disease prevention (for example, do not medicate entire flocks/herds via feed or water, or apply 'dry cow' antibiotics for dairy animals, unless testing and sensitivity is completed and then directed by a veterinarian). Implement robust animal welfare systems and standards, including measures to ensure best practices in housing, animal

management, and disease prevention approaches. Then develop and direct strict antimicrobial stewardship programmes ensuring need, dosage, selection, delivery, and treatment duration are observed — alongside employee capacity building and the monitoring and reporting of antibiotic use.

- **Monitor and Report Risks:** Actively monitor and annually report antibiotic use, reduction and AMR-related risks, especially in pharmaceutical manufacturing, food production, and effluent management. Support surveillance and data sharing to contribute to national and global monitoring for AMR risk-reduction efforts and antibiotic reduction.

Investors Should:

- **Integrate AMR into ESG and Due Diligence:** Apply an "AMR lens" to investment decisions by screening companies for responsible antibiotic manufacturing, stewardship, and transparent reporting. Treat AMR risk as a material ESG factor.
- **Engage for Best Practices:** Actively engage with companies to encourage adoption of AMR risk-reduction best practices, including stewardship programmes, responsible sourcing, and transparent annual disclosure of antibiotic use monitoring and reduction.
- **Demand Disclosures and Tie to Financing:** Request clear disclosures on AMR management from portfolio companies, especially in agriculture, aquaculture, food, and pharmaceutical sectors. Where relevant, link AMR outcomes to sustainability-linked financing, using KPIs tied to responsible antibiotic use, reduction, higher welfare, pollution control, and auditing of supply chains.

GLOSSARY OF TERMS

Antimicrobial	Antimicrobials – including antibiotics, antivirals, antifungals, and antiparasitics – are medicines used to prevent and treat infectious diseases in humans, animals, and plants.
Food-producing animals	Animals used in production of food. The term "food-producing animals" includes all terrestrial and aquatic animals used to produce food. Also considered an equivalent term to "food animals".
Medically important antimicrobials	Antimicrobial classes used in human medicine and therefore listed on the WHO CIA List, where they are categorised according to specified criteria as "important", "highly important" or "critically important" for human medicine. Categorisation criteria, definitions for the categories and a complete list of medically important antimicrobials are available on the WHO website.
Critically important antimicrobial	Antimicrobial in an antimicrobial class providing the sole therapy, or one of limited available therapies, to treat serious bacterial infections in humans and used to treat infections in humans caused by either: (i) bacteria that may be transmitted to humans from non-human sources, or (ii) bacteria that may acquire resistance genes from nonhuman sources. A complete list of critically important antimicrobials is available on the WHO website.
Growth promotion uses of antimicrobial	Antimicrobial growth promoters or antibacterial compounds that are added to animal feed or water in subtherapeutic amounts for extended periods of time to enhance production performance of agricultural animals as measured by increased feed efficiency (ratio of feed input to weight gain).
Preventative/ prophylactic use	The administration of antimicrobial agents to healthy animals — individually or in groups – before any clinical signs of disease appear, with the aim of preventing infection or disease in situations where there is a known risk or likelihood of exposure.
Therapeutic (Treatment) Use of Antibiotics in Food Animals	The use of antimicrobials for the specific purpose of treating an animal(s) with a clinically diagnosed infectious disease or illness.

Annexure I: Key Controls and Legislations on Antibiotic Usage and AMR in India

Area/Sector	Regulation/Control	Description/Key Points	Status/ Year
Food Production	Ban on Colistin and Critical Antibiotics	Prohibits use of colistin and certain antibiotics in livestock and food production.	Enforced (2019-20)
	FSSAI Antibiotic Residue Limits	Sets strict residue limits for antibiotics in meat, milk, poultry, eggs, aquaculture; bans in honey.	Effective April 2025
National Policy	National Action Plan on AMR (NAP-AMR)	Multisectoral plan aligning with WHO; focuses on awareness, surveillance, infection prevention, etc.	Launched 2017, ongoing
Human Health	Schedule H & H1 Drugs (Drugs Rules, 1945)	Prescription-only sales for antibiotics; Schedule H1 requires record-keeping and special labelling.	Ongoing
	Red Line Campaign	Marks prescription-only antibiotics with a red line to raise public awareness.	Ongoing
Surveillance	ICMR AMR Surveillance Network	National network for monitoring AMR trends in pathogens.	Ongoing
	Participation in WHO GLASS	Contributes national AMR data to global surveillance system.	Ongoing
Environmental Controls	Draft Effluent Standards for Pharma Industry	Standards for antibiotic residues in pharmaceutical waste and effluents.	Drafted, not finalised

Annexure II: Current Regulations on Antibiotic Use in Animal Farming

Country/ Region	Ban for growth promotion use (absolute)	Prescription required	Ban or phase out of routine group prophylactic use
China	Yes (Antibiotic Growth Promoters, or AGPs, and colistin from 2017 to 2020, with significant exceptions)	Yes	No (however, 2019 regulation withdrew medicated feed additives)
Hong Kong	No (with the exception of selected AGPs and avoparcin)	Yes	No
Taiwan	Yes (avoparcin banned at least as a feed additive from 2000[59])	Yes	No
Japan	No	Yes	No
South Korea	Yes (from 2011)	Yes	No
Thailand	Yes (from 2015)	Yes (for critically important antibiotics)	No (except some antimicrobials banned in feed and water, 2018[60])
Vietnam	Yes (from 2018)	Yes (2020, for all prophylactic and therapeutic use of antibiotics[61])	**Yes (phased ban from 2020 and total ban from 2026 except for therapeutic treatments of diagnosed diseases with veterinary prescription[62])**
Philippines	No	No	No
Singapore	Yes (from 2017 or earlier[63])	No	No
Malaysia	Yes (colistin and others, but not all AGPs, from 2012 to 2020[64], by 2025 to phase out 23 medically important antibiotics[65])	No	**Yes (ampicillin, avilamycin and various sulfonamides and some others prior in feed; most human medically important antibiotics permitted[66])**
Indonesia	Yes (from 2017; effective 2018)	No	**~Yes, encourage only therapeutic use (for treatment only). 2019 ban on blanket ban for colistin[67]**
India	Yes (key antibiotics, including colistin in 2019[68], as of 2024–2025, banned for growth promotion and residue control in meat, poultry, dairy, eggs, aquaculture, and expanded in 2025[69] to cover milk)	No	No (though some restrictions for farmed fishery exports[70])
Australia	No (with the exception of some AGPs and some critical antibiotics never permitted for animal use[71])	Yes	No
US	Yes (from 2017)	Yes	No
UK	Yes (from 2006)	Yes	**Yes (routine use now banned; prophylactic use restricted to exceptional circumstances only, but group prevention not fully banned[72])**
EU (plus Switzerland)	Yes (from 2006; Sweden first in 1996; includes imports to EU from 28 January 2022) [73]	Yes	**Yes (approved in 2018; EU ban came into force 28 January 2022; ban on antibiotic use in feed/water and ban on group prophylactic use etc.[74])**

Source: Compiled by ARE

[1] https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
[2] https://journals.plos.org/globalpublichealth/article/figure?id=10.1371/journal.pgph.0001305.g003
[3] 538f0cc3-2697-4ca1-8fbe-f95122b16d82
[4] https://accesstomedicinefoundation.org/medialibrary/20250303-iaamr-signatories-for-atmf-website.pdf
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