Organic Dairy Farming in the Context of Antibiotic Resistance

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ABSTRACT

Antimicrobial resistance is one of the major public health problems especially in developing countries where relatively easy availability and higher consumption of medicines have lead to disproportionately higher incidence of inappropriate use of antibiotics and greater levels of resistance compared to developed countries (WHO, 1996). The use of medicines, especially antibiotics, in livestock and dairy animals is essential for disease prevention and treatment. However, excessive or improper use of antibiotics can lead to antibiotic resistance, where bacteria become resistant to drugs, making infections harder to treat. This not only affects animal health but also poses serious risks to humans through residues in milk, meat, and the environment (Smith & Jones, 2019). Organic milk production plays an important role in reducing antibiotic resistance by strictly limiting the use of antibiotics in dairy farming. In organic dairy systems, routine, preventive, and growth-promoting use of antibiotics is prohibited (FAO, 2011; APEDA, 2023).

INTRODUCTION

Recent studies and surveys conducted in Indian states such as Punjab and Kerala have reported that approximately 12.5% to 16% of commercially available milk samples contained antibiotic residues. In several cases, the detected levels were far above the Maximum Residue Limits (MRLs) considered safe for human consumption (CSE, 2018).

The **National Centre for Disease Control (NCDC) and ICMR jointly release AMR** trend analyses as part of the Government's National Action Plan on AMR. The surveillance analysis shows:

- E. coli was the most commonly isolated pathogen (34% of samples), particularly from urine.
- Staphylococcus aureus was common in pus samples (27%), while Acinetobacter spp. dominated blood samples (23%).
- Methicillin-resistant Staphylococcus aureus (MRSA) resistance in blood samples decreased from 66% in 2019 to 55% in 2023.
- Vancomycin-resistant Enterococcus (VRE) increased from 9% in 2020 to 19% in 2023 (GOI, 2025).

Bengaluru Milk Study-

- A study on milk from small-scale dairy households in Bengaluru found antibiotic residues in 21% of samples tested.
- Within those:
  - 7.1% exceeded Maximum Residue Limits. (MRL)
  - 5.52% had multi-drug residues.
- This study combines antibiotic residue testing with surveys on handler practices and shows misuse of antibiotics in livestock (Bengaluru Milk Residue Study, 2020).

Effects on Human Health-

- **Antibiotic Resistance (AMR):** This is one of the most critical threats in 2026. Massive use of sub-therapeutic antibiotics in industrial livestock to promote growth drives the evolution of resistant bacteria like MRSA, which can transfer to humans through meat.
- **Carcinogenic Risks:** Non-organic meat may contain residues of hormones and pesticides (like DDT and lindane) linked to breast, prostate, and colorectal cancers. Additionally, the World Health Organization (WHO) classifies processed meats as carcinogenic and red meat as "probably carcinogenic".
- **Neurological and Developmental Impacts:** Pesticide residues in animal products are linked to ADHD, low IQ in children, and neurodegenerative diseases such as Alzheimer's and Parkinson's.
- **Hormonal and Reproductive Issues:** Synthetic hormones and endocrine-disrupting pesticides (like organophosphates) can lead to early puberty, infertility, and metabolic disorders like Type 2 diabetes.
- **Nutritional Differences:** Studies indicate that organic animal products generally contain higher levels of beneficial Omega-3 fatty acids compared to their inorganic counterparts (Smith & Jones, 2019).

Organic Farming and Organic Dairy Farming-

- Accordind to FAO- Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs (FAO, 2011).

Organic Dairy Farming means **raising animals on organic feed** i.e., pastures cultivated without the use of fertilizers or pesticides, along with the **restricted** usage of antibiotics and hormones. Milk produced from such dairy cattle qualifies as organic milk.

Definition of organic dairy farming involves raising cattle on 100% organic feed (pastures free of synthetic pesticides/fertilizers, no GMOs), ensuring access to the outdoors, prohibiting routine antibiotics and synthetic hormones, and adhering to strict welfare standards, all under certification by bodies like the USDA or India's APEDA, ensuring natural processes and environmental health (FAO, 2011).

Guidelines of organic dairy farming according to NPOP (National Program for Organic Production)

1. General Principles for Organic Livestock

- Feeding with organic feed and fodder
- Access to grazing in organic fields
- Freedom to express natural behaviour
- No routine use of synthetic veterinary drugs, antibiotics, hormones, growth promoters, or prohibited feed additive

2. Conversion Period

Before an animal's products (milk/meat/eggs) can be labelled organic

- Livestock must be under organic management for a specified period.
- For dairy animals (e.g., cows, buffaloes), the animal must be managed organically for at least 6 months before its milk can be sold as organic.
- During this period, the feed, grazing land, and management system must be certified organic.

3. Feed and Fodder Requirements

- Organic feed and fodder, grown without synthetic pesticides or fertilizers.
- Feed must not include prohibited substances such as GMOs, synthetic growth stimulants, non-therapeutic antibiotics, or medicated feeds
- Health Care and Antibiotics.
- Routine antibiotics and synthetic growth promoters are prohibited.
- If a sick animal requires treatment that has no natural alternative, allopathic veterinary drugs including antibiotics may be used under a registered veterinarian's supervision.
- Withdrawal periods must be strictly observed, and the animal's products (milk/meat) cannot be sold as organic until after twice the regular withdrawal period (minimum of 48 hours) has passed.

4. Breeding and Management

- Natural breeding is encouraged; artificial reproductive technologies are limited to therapeutic needs.

5. Animal Welfare

- Adequate space for movement.
- Clean and safe housing.
- Access to natural light and outdoors.
- Systems that support low stress and natural behaviour in animals, continuous confinement or inhumane restraint practices are not allowed.

6. Record Keeping

Organic dairy farmers must maintain records of

- Animal identification and origin.
- Organic feed sources.

- Veterinary treatments and withdrawal periods.
- Grazing and housing details.

7. Certification & Logo Use

- Certification must be obtained from an APEDA-accredited organic certification body under NPOP rules.

8.Validity of the Certificate

- An organic certificate issued under NPOP is valid for one year (12 months).
- This applies to all operators (farmers, dairy units, processors) certified by APEDA-accredited certification bodies (APEDA, 2023).

How to Apply for Organic Certification under NPOP

- Organic certification in India is done under the National Programme for Organic Production (NPOP).
- The applicant must choose an APEDA-accredited certification body.
- Application is submitted directly to the certification body, not to APEDA.
- The farmer/dairy unit submits a duly filled application form.
- An Organic Management Plan (OMP) describing farming and dairy practices is required.
- If the farm is conventional, a conversion period must be completed.
- The certification body conducts an on-site inspection of the farm.
- Inspection reports are reviewed for compliance with NPOP standards.
- On approval, an organic certificate valid for one year is issued.
- The certificate must be renewed annually after inspection and verification.

Platforms for sell milk directly to consumers via app or subscription-

1. **Akshayakalpa Organic** – Karnataka-based certified organic milk. They provide farm onboarding and direct doorstep delivery. Website: https://akshayakalpa.com
2. **Puresh Daily** – Farm-fresh milk delivery platform. Farmers can partner for local delivery. Website: https://pureshmilk.com
3. **Farmery / Ordefy** – Platforms for farmers to list organic milk for local subscription-based delivery. Website: https://www.farmery.in Website: https://www.ordefy.com/sell-milk
4. **Organica Foods** – Partner with farmers for organic milk, ghee, paneer.Website: https://organicafood.in

Some Frequently asked Questions

Q- what is the market price of organic milk in Indian market?

A-₹80 to ₹100+ per litre is typical for certified organic milk sold online or in organic grocery platforms.

Q- How high is the demand for organic milk in Indian market?

A-Surveys in India show that milk and dairy products are among the most preferred organic foods, with around 45% of urban consumers regularly choosing organic milk due to health and safety concerns (ASSOCHAM). Large surveys like Rakuten Insight confirm strong interest in organic milk across men and women nationwide. Demand for organic products,

especially milk, has grown threefold in metros such as Mumbai, Delhi, and Bangalore over recent years. Urban consumers are increasingly purchasing organic products regularly, driven by health awareness. The organic milk market, valued at ~₹12,900 million in 2024, is projected to grow rapidly (~25% CAGR through 2033), reflecting high consumer willingness to buy certified organic milk.

Q-Is Vaccination is allowed in organic dairy farming?

A-Permitted as a preventive health measure, helps maintain animal health and welfare,

Only necessary vaccines should be used, routine unnecessary chemicals are not allowed.

Q-Is artificial insemination allowed in organic dairy farming?

A-Yes, Allowed, but mainly for improving genetics and reproductive health.

Q- Is organic milk more nutritious compare to non-organic milk?

- Fat Content-Organic milk often has slightly higher omega-3 fatty acids due to pasture grazing. Non-organic milk generally has lower omega-3 but similar total fat.
- Vitamins & Minerals-Organic milk may contain more antioxidants (vitamin E, carotenoids) and slightly higher vitamin A. Calcium, phosphorus, and other minerals are generally similar in both types.
- Pesticide & Antibiotic Residues-Organic milk: No synthetic pesticides, hormones, or routine antibiotics. Non-organic milk, may have trace residues depending on feed and management.
- Taste & Quality- Organic milk is often reported as creamier with richer flavor due to pasture feeding and lower homogenization.

CONCLUSION:

The use of organic milk offers multiple health and environmental benefits. It is free from synthetic hormones, antibiotics, and chemical residues, making it safer and more nutritious for consumers. Organic milk also supports sustainable farming practices, animal welfare, and reduces environmental pollution from chemical inputs. Increasing awareness and demand for organic milk reflect a growing preference for healthy, natural, and eco-friendly food choices. By choosing organic milk, consumers not only safeguard their health but also contribute to responsible and sustainable dairy farming.

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