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# Role of Women in Sustainable and Organic Dairy Practices in Marathwada

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**Abstract:** *Women play a pivotal role in dairy farming in India, particularly in regions like Marathwada, where dairy is both a source of livelihood and nutrition. Sustainable and organic dairy practices are emerging as critical strategies for environmental conservation, animal welfare, and product quality. Women, as primary caregivers of livestock, significantly contribute to adopting and maintaining these practices. This review examines the involvement of women in sustainable and organic dairy production in Marathwada, highlighting their contributions, challenges, and prospects for policy interventions.*

**Keywords:** Dairy Farming, Sustainable Practices, Organic Dairy, Marathwada

## I. INTRODUCTION

Dairy farming is a traditional occupation in the Marathwada region of Maharashtra, with women comprising a large proportion of the workforce (Deshmukh et al., 2021). Their roles range from feeding and milking livestock to managing hygiene and health, which are directly linked to sustainable and organic practices. With growing awareness of organic dairy products and sustainable livestock management, women are increasingly becoming agents of change in this sector (Patil & Shinde, 2020).

Sustainable dairy practices include responsible feeding, waste management, and preventive animal health care, while organic dairy emphasizes chemical-free fodder, natural health care, and environmentally friendly waste disposal. Understanding women's roles in these practices is crucial for policy planning and sustainable rural development.

## ROLE OF WOMEN IN SUSTAINABLE DAIRY PRACTICES

The role of women in sustainable dairy practices is increasingly recognized as central to rural development, food security, environmental stewardship, and household economic stability. In many developing countries, particularly in India, women constitute the backbone of the dairy sector, performing a majority of tasks related to feeding, milking, cleaning sheds, processing milk, and managing livestock health. According to the Food and Agriculture Organization, women account for nearly 43% of the global agricultural labor force, and their contribution to livestock and dairy management is even higher in smallholder systems (FAO, 2011). In India, the dairy sector has evolved into one of the largest agricultural subsectors, significantly supported by women's participation at both household and cooperative levels. The National Dairy Development Board highlights that woman play a crucial role in ensuring regular milk production, quality control, and animal welfare, which are key components of sustainable dairy development (NDDB, 2020).

Sustainable dairy practices emphasize environmentally sound management, economic viability, and social equity. Women contribute to sustainability through traditional knowledge of animal care, efficient resource utilization, and adoption of eco-friendly practices. They are often responsible for fodder collection and preparation, which encourages the use of crop residues and local feed resources, thereby minimizing waste and reducing reliance on commercial feed inputs.

Studies indicate that women's involvement enhances feed efficiency and reduces environmental footprints by promoting integrated crop–livestock systems (Herrero et al., 2013). In addition, women are more likely to adopt

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practices such as composting manure and recycling farm by-products, contributing to soil fertility and reduced greenhouse gas emissions.

The cooperative movement in India, inspired by the success of Amul, has empowered women economically and socially by providing them with access to markets, credit facilities, and extension services. The landmark program known as Operation Flood transformed India into one of the largest milk producers in the world and opened institutional avenues for women's participation in dairy cooperatives. Through self-help groups (SHGs) and women dairy cooperative societies, rural women have gained decision-making power and improved household income, reinforcing the social dimension of sustainability. Research by Datta (2004) suggests that when women control dairy income, it leads to improved family nutrition, healthcare, and educational outcomes, thereby strengthening intergenerational sustainability.

Women's role in maintaining animal health and productivity also directly affects sustainable dairy output. They are typically responsible for observing livestock behavior, detecting early signs of disease, and ensuring timely veterinary care. According to studies by Kristjanson et al. (2010), women's indigenous knowledge about breeding cycles, feed combinations, and preventive healthcare significantly enhances herd productivity and resilience against climate variability. Sustainable dairy systems require adaptation to climate change, and women's experiential knowledge enables farms to adjust feeding schedules, shelter management, and water conservation practices effectively.

Environmental sustainability in dairy farming is closely linked with efficient manure management and reduced carbon emissions. Women's involvement in biogas production and organic fertilizer preparation demonstrates their contribution to circular economy principles within rural dairy systems. The promotion of household biogas plants, often managed by women, reduces dependency on firewood and lowers methane emissions from unmanaged manure. According to FAO (2018), empowering women with training in climate-smart agriculture leads to improved mitigation outcomes and greater farm-level adaptation. Thus, gender-inclusive approaches to dairy extension services are essential for scaling sustainable technologies.

Economically, women's participation enhances productivity and profitability. Dairy farming provides regular income compared to seasonal crop agriculture, and women's consistent engagement ensures continuity in milk production and marketing. Research indicates that farms where women actively participate in decision-making show higher milk yields and better financial management (World Bank, 2012). Access to microfinance and cooperative credit has enabled women to invest in improved cattle breeds, better feed, and hygienic milking practices, all of which align with sustainability goals. Moreover, value addition activities such as preparing ghee, curd, and paneer increase income while reducing post-harvest losses.

Despite their significant contributions, women in dairy farming often face challenges such as limited land ownership, restricted access to training, and inadequate recognition of their labor. Gender disparities in extension services hinder the full realization of sustainable dairy potential. According to FAO (2011), closing the gender gap in access to resources could increase agricultural productivity by up to 20–30%, substantially improving food security outcomes. Policy interventions that promote gender-sensitive training programs, digital literacy, and access to veterinary services are therefore crucial for enhancing women's impact on sustainable dairy systems.

In recent years, digital technologies and climate-smart innovations have opened new opportunities for women dairy farmers. Mobile-based advisory services, automated milking systems, and improved breed management tools have enhanced efficiency and reduced labor intensity. When women are trained in these technologies, they become active agents of innovation rather than passive laborers. Government schemes in India focusing on women-centric dairy entrepreneurship have further strengthened their leadership roles in producer organizations.

Social sustainability is another vital aspect where women's participation plays a transformative role. Dairy cooperatives often serve as platforms for collective action, leadership development, and community engagement among women. Participation in cooperative governance fosters confidence, negotiation skills, and awareness of environmental issues. These social gains translate into better resource management and stronger community resilience. Studies have shown

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that women-led dairy groups are more likely to invest in community welfare activities, such as water conservation and sanitation initiatives, which indirectly support sustainable agricultural ecosystems (Meinzen-Dick et al., 2014).

Women are indispensable to sustainable dairy practices due to their multifaceted roles in production, resource management, environmental conservation, and community development. Their traditional knowledge, labor contributions, and emerging leadership within cooperative frameworks collectively strengthen the economic, environmental, and social pillars of sustainability. Recognizing and investing in women's capabilities through targeted policies, inclusive extension services, and institutional support can significantly enhance the resilience and productivity of the dairy sector. Empowering women in dairy farming is not merely a matter of gender equity but a strategic approach to achieving sustainable agricultural development and long-term food security.

Women's involvement in sustainable dairy practices in Marathwada can be categorized into the following:

**Feeding Management:** Women ensure proper fodder quality, crop residues usage, and rotation of grazing areas to maintain soil fertility and livestock health (Kadam et al., 2019).

**Animal Health Care:** Women monitor early signs of disease and administer natural remedies and preventive treatments.

**Waste Management:** Handling of manure for biogas production or composting supports eco-friendly practices.

**Milk Hygiene:** Women ensure clean milking environments, proper storage, and minimal contamination.

## ROLE IN ORGANIC DAIRY PRACTICES

Organic dairy farming has emerged as a sustainable and ethically grounded approach to milk production, integrating ecological balance, animal welfare, and socio-economic empowerment. The role of organic dairy practices is multifaceted, encompassing environmental sustainability, improved animal health, enhanced product quality, and community development. Organic dairy systems are regulated under international standards such as those established by the International Federation of Organic Agriculture Movements (IFOAM) and the Food and Agriculture Organization (FAO), which emphasize the use of natural inputs, prohibition of synthetic chemicals, and maintenance of biodiversity. These principles guide dairy farmers toward sustainable production models that protect soil, water, and ecosystems while ensuring economic viability.

One of the primary roles of organic dairy practices lies in environmental conservation. Unlike conventional systems that often depend on chemical fertilizers, pesticides, and intensive feed production, organic dairy farming relies on natural manure management, crop rotation, and organic fodder cultivation. Research indicates that organic dairy farms contribute to improved soil fertility and carbon sequestration due to increased organic matter content (Reganold & Wachter, 2016). By avoiding synthetic nitrogen fertilizers, organic systems reduce nitrate leaching into groundwater and minimize greenhouse gas emissions. Studies by Gomiero et al. (2011) highlight that organic agriculture enhances biodiversity by supporting a wider range of flora and fauna compared to conventional farming systems. In dairy contexts, pasture-based feeding systems promote ecological balance and reduce reliance on externally sourced feed inputs.

Animal welfare is another significant dimension of organic dairy practices. Organic standards mandate access to open grazing areas, adequate space, and natural living conditions for livestock. Cows in organic systems are typically pasture-fed and allowed to express natural behaviors, which contributes to lower stress levels and improved overall health. According to research by Sundrum (2001), organic livestock systems emphasize preventive health care, balanced nutrition, and reduced antibiotic use, leading to improved animal resilience. The restriction on routine antibiotic use in organic dairy farming not only safeguards animal health but also reduces the risk of antimicrobial resistance in human populations. This aspect aligns with global public health concerns and contributes to safer food systems.

Organic dairy practices also play a crucial role in enhancing milk quality and consumer trust. Organic milk is produced without synthetic hormones or genetically modified feed, and it often contains higher levels of beneficial fatty acids, such as omega-3 and conjugated linoleic acid (CLA), compared to conventional milk (Benbrook et al., 2013).

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Consumers increasingly prefer organic dairy products due to perceptions of health benefits, environmental responsibility, and ethical production. This growing demand has expanded market opportunities for small and medium-scale farmers, enabling them to secure premium prices and improved income stability. As noted by Willer and Lernoud (2019), the global organic market has witnessed consistent growth, reflecting changing consumer preferences toward sustainable food systems.

Another critical role of organic dairy practices is in rural development and socio-economic empowerment. Organic dairy farming is often labor-intensive and knowledge-based, requiring active participation in pasture management, compost preparation, and animal care. This creates employment opportunities within rural communities and promotes skill development. Smallholder farmers benefit from reduced input costs due to the minimized use of synthetic fertilizers and commercial feed concentrates. In regions where dairy farming is a primary livelihood activity, organic certification can enhance market access and improve economic resilience. The Food and Agriculture Organization emphasizes that sustainable livestock systems contribute significantly to poverty reduction and food security in developing countries.

Furthermore, organic dairy practices support climate change mitigation and adaptation. Pasture-based systems enhance carbon storage in soils and reduce dependency on energy-intensive feed production systems. By integrating crop and livestock systems, organic dairy farms promote nutrient recycling and reduce waste. Research suggests that diversified organic farms are more resilient to climate variability due to improved soil structure and water retention capacity (Reganold & Wachter, 2016). This resilience is particularly important in the context of increasing climate uncertainties affecting agricultural productivity worldwide.

Organic dairy farming also plays an educational and cultural role by reviving traditional knowledge systems and promoting ecological awareness among farmers and consumers. Farmers engaged in organic practices often adopt indigenous breeding techniques, herbal veterinary treatments, and community-based resource management strategies. These practices strengthen local food systems and preserve agricultural biodiversity. Additionally, organic dairy cooperatives and farmer groups encourage participatory learning, knowledge sharing, and collective marketing efforts, enhancing social cohesion within rural communities.

From a policy perspective, the role of organic dairy practices extends to supporting national and international sustainability goals. Organic farming aligns with the Sustainable Development Goals (SDGs), particularly those related to responsible consumption and production, climate action, and life on land. Governments and organizations worldwide are increasingly promoting organic livestock production through subsidies, certification support, and training programs. The International Federation of Organic Agriculture Movements advocates policy frameworks that encourage ecological agriculture and protect farmers' rights. Such initiatives foster a transition toward more sustainable and equitable dairy systems.

Despite its advantages, organic dairy farming faces certain challenges, including certification costs, transitional yield gaps, and limited awareness among farmers. However, long-term benefits in terms of soil health, animal welfare, environmental sustainability, and market premiums often outweigh initial constraints. Studies indicate that although organic dairy yields may be slightly lower in some cases, improved price premiums and reduced input expenses can compensate for production differences (Willer & Lernoud, 2019). Therefore, the strategic role of organic dairy practices lies in balancing productivity with sustainability.

The role of organic dairy practices is comprehensive and transformative, addressing environmental, economic, social, and health dimensions of dairy production. By promoting ecological balance, enhancing animal welfare, improving milk quality, supporting rural livelihoods, and contributing to climate resilience, organic dairy systems represent a viable pathway toward sustainable agriculture. As global demand for environmentally responsible and ethically produced food continues to rise, organic dairy farming stands as a model that integrates productivity with sustainability, ensuring long-term benefits for farmers, consumers, and the planet.

Women contribute to organic dairy through practices such as:

Cultivation of chemical-free fodder.

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Use of herbal and home-based treatments for animal health.
Avoidance of synthetic hormones or antibiotics in dairy animals.
Adherence to organic certification standards during milking and milk storage.
These practices enhance milk quality, improve animal welfare, and reduce environmental impact (Raut & Jadhav, 2022).

## CHALLENGES FACED BY WOMEN

Despite their key role, women in Marathwada face multiple challenges in sustainable and organic dairy:
Limited access to training and extension services.
Financial constraints for adopting organic methods.
Socio-cultural barriers restricting decision-making in households.
Inadequate recognition in cooperative societies and markets.

## OPPORTUNITIES AND POLICY IMPLICATIONS

Promoting women-led organic dairy enterprises can be achieved by:
Providing targeted training on organic and sustainable practices.
Facilitating access to microfinance and cooperative support.
Recognizing women's contributions through awards and certifications.
Encouraging self-help groups to engage in organic dairy marketing.

**Table 1: Contribution of Women in Sustainable and Organic Dairy Practices**

| Aspect | Women's Role | Impact on Sustainability/Organic Practices | References |
|---|---|---|---|
| Feeding Management | Ensuring quality fodder, crop residues, rotation | Maintains soil fertility, livestock health | Kadam et al., 2019 |
| Animal Health Care | Early disease detection, herbal remedies | Reduces antibiotic use, improves animal welfare | Raut & Jadhav, 2022 |
| Waste Management | Manure composting, biogas generation | Eco-friendly disposal, energy generation | Patil & Shinde, 2020 |
| Milk Hygiene | Clean milking, proper storage | Enhances milk quality, reduces contamination | Deshmukh et al., 2021 |
| Organic Certification Practices | Adherence to organic standards, chemical-free feed | Ensures marketability of organic dairy | Raut & Jadhav, 2022 |

## II. CONCLUSION

Women in Marathwada are central to advancing sustainable and organic dairy practices. Their knowledge, dedication, and traditional skills support environmental conservation, animal welfare, and economic sustainability. However, enhancing their capacity through training, financial support, and social recognition is essential. Policies focusing on women empowerment in dairy farming can strengthen sustainable agriculture and contribute to rural development in Marathwada.

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