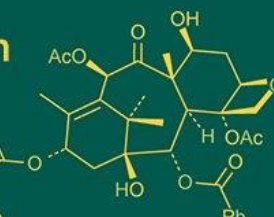


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(5): 250-254
www.biochemjournal.com
Received: 11-03-2026
Accepted: 16-04-2026

Virendra Kumar Prajapati
Research Scholar, Department
of Agriculture, Sunrise
University, Rajasthan, India

Dr. Narendra Singh Gurjar
Research Guide, Department
of Agriculture, Sunrise
University, Rajasthan, India

Analyzing the prospects of organic dairy production in India's future

Virendra Kumar Prajapati and Narendra Singh Gurjar

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i5Sc.8364>

Abstract

While attaining the objectives of organic farming—diverse output and biological cycle maintenance—dairy farming may increase farmers' revenue. India's dairy industry has grown so quickly that it is currently the largest milk producer in the world. Concerns about pollution, contaminants, and chemical residues in milk and milk products have increased as a result of consumer awareness. Globally, organic dairy farming is becoming more and more popular as a substitute. Organic dairy products and milk have gained popularity recently. India's organic dairy industry is expanding quickly because of the country's traditional farming methods, indigenous technical know-how, and economic, cultural, and physical advantages. However, among other issues, small and marginal dairy producers present a number of obstacles to the quicker growth of organic dairy production. This article discusses the possibilities, dangers, weaknesses, and strengths of organic dairy production in the country and suggests strategies to solve these issues.

Keywords: Opportunities, organic dairy farming, organic standards, strengths, threats, weaknesses

Introduction

Concerns about conventional farming, which uses artificial inputs to increase yields while harming the environment and people, have led to a resurgence of interest in organic agriculture and animal husbandry. One of the main causes of biodiversity loss is intensive farming, which introduces foreign species, clears land, breaks up vegetation, modifies ecosystems, and erodes soil. On the other hand, organic farming creates a dynamic and sustainable environment for the production of food and feed by increasing soil organic matter and biology, which helps both flora and fauna. Natural resources are deteriorating in regions where intensive farming has been practiced for a long time. Toxic residues from chemical-intensive farming are found in the food chain, according to numerous studies. An organic production system can meet consumer demands for high animal welfare standards, product traceability, chemical-free, healthful, and environmentally friendly meals. Consequently, Indian farmers are raising organic livestock and crops. It is the only interesting and practical solution for sustainable agriculture in developing nations because of its special combination of low-cost external inputs and technology, environmental preservation, and input/output efficiency. Organic dairy farming is very recent in comparison to organic agriculture. In the 1990s, organic dairy emerged as a significant player in the organic market. It was seen late in India. Cows fed organic feed must be given pasture or outdoor area, and antibiotics and hormones must be reduced. Its objective is to stay away from GMO breeding materials, feed additives, and medications. The production of organic dairy products depends on animal welfare. Organic dairy farming follows goal-oriented criteria to ensure organic purity.

Prospects of organic dairy farming in India: Given the popularity of conventional and integrated agricultural systems in rural India and the growing demand for healthful food products in both domestic and foreign markets, organic farming may be advantageous to Indian farmers. In contrast to crop farming, developing nations like India produce less dairy. Certain Indian agroclimatic conditions are optimal for producing organic milk. Hilly Himachal Pradesh, Uttaranchal, Jammu & Kashmir, Tamil Nadu, and the northeast are some of these regions. Included are the rainy regions of Madhya Pradesh, Gujarat, and Rajasthan.

Corresponding Author:
Virendra Kumar Prajapati
Research Scholar, Department
of Agriculture, Sunrise
University, Rajasthan, India

The sluggish adoption of green revolution technologies has prevented many towns and regions from using agrochemicals. These regions are known as "organic zones." North Eastern India has a lot of potential for organic farming due to its low chemical use. 18 million hectares of such land might be used for systematic organic farming. The Trans-Gangetic plains, including Punjab, Haryana, Western U.P., and portions of Rajasthan, have the greatest crop husbandry intensification, including agrochemicals, inorganic fertilizers, and crop rotations. However, this region's dairy production is less developed than in other wealthy countries, which makes it easily convertible to organic practices. Since smallholders use low-input, agricultural residual feed to produce 70% of the nation's milk, organic dairy farming has a bright future. Therefore, low-input, profitable, and ecologically conscious production should be possible with these systems. Organic dairy production is under risk due to the industry's high percentage of landless and small-scale dairy farmers, particularly because of certification and traceability concerns.

These small-scale farmers, who only produce a few liters of milk per day, are unable to sell their milk as organic due to illiteracy and the absence of a local organic market. The cooperative may contribute to the growth of organic dairy production in these isolated interior areas by certifying, obtaining, processing, and marketing organic milk. Because organic products are not as well-liked in the nation, manufacturers have to export them in order to get paid more. Compared to fruits, cereals, and herbs, animal products are almost never exported from developing countries and make up a small share of the organic market. Thus, organic dairy farming in India must be honestly assessed for its pros, disadvantages, prospects, and dangers.

Strengths

Availability of quality indigenous breeds: In organic dairy production, breed requirements differ significantly by region. One dairy cow is neither successful nor advised in India's diverse population. Unlike other countries, India has a variety of excellent native breeds for every location. Sahiwal, Gir, Red Sindhi, Rathi, Tharparker, Murrah, Surti, Nili Ravi, Jaffrabadi, and Mehsana buffalo are the top native milk producers.

Natural and integrated farming system: Agro-ecosystem complexity, crop variety, the transition from monoculture to mosaic, and the best possible spatial and temporal component integration are all part of organic farming. Organic livestock agriculture is a good fit for India's integrated crop-livestock farming system with a varied animal population. Near organic farming, the majority of Indian farmers continue to practice natural farming with little external inputs, particularly for animal production, and maximum on-farm reliance. Including a variety of crops and animals guarantees the availability of inputs for dairy and agricultural enterprises as well as efficient recycling of byproducts. Additionally, its synergistic interactions make a greater contribution than their separate impacts.

Resistance to diseases: Indian dairy breeds are good for organic care since they are less vulnerable to sickness and stress and use less allopathic medicine/antibiotics. Ayurvedic or homeopathic medicine may be used to address

medical conditions. Indian farmers' rich biodiversity and traditional knowledge may aid in the treatment and rehabilitation of sick animals. Increased research provided adequate information and technology for disease prevention and nutrition control in organic dairy production systems.

Animal welfare: Unlike in Western countries, dairy farming in India is primarily extensive or semi-extensive and does not employ animals as commercial vehicles. Because of their morals and religious beliefs, common Indian farmers defend animal welfare.

Indigenous technical knowledge: Traditional Indian knowledge encompasses all facets of agriculture. Farmers frequently use herbal remedies such as Ayurveda. India has an advantage over developed countries since allopathic medicine is rarely used, saving money.

Better performance of dairy animals: Although organic farming lowers yields by 10%, organic cows may still yield well. Buffaloes raised organically outperformed those raised conventionally in terms of lengths, 305-day milk production, and overall lactation yields. Studies conducted in Europe indicated that 80-105% of the milk produced by organic buffaloes was healthier than that of controls. Despite typically reduced milk output, organic care reduces metabolic stress. Reproductive function frequently becomes better. Organic livestock may provide milk that is equivalent if given the right nutrients.

Weaknesses

Small and Marginal farmer: Dairy and agricultural production in India is dominated by small and marginal farmers. Seventy percent of the milk came from small farms. Milk and other products are difficult to track due to the large number of small producers. Due to increased local demand for organic commodities and India's historic co-operative tradition, notably in dairy, co-operative dairy farming and contract farming may overtake small and marginal farmers. For organic milk production and marketing, study the Kerala Ksheerasamruddhi model, which employs Self Help Groups to produce, bottle, and transport high-quality milk to customers.

Incidence of disease: Even though rinderpest has been eradicated in India, the quality and export of dairy products are restricted by foot and mouth disease and mastitis in some areas. To produce organic milk, India needs to upgrade its unclean production and processing facilities. Bans on preventative treatment and outdoor rearing put organic animals in peril. The biggest threat to animal health and organic dairy products is parasites. Hermansen (2003)^[20] and Kouba (2003)^[29]. In western countries with strict organic requirements, product clearance depends on controlling these diseases. Plant extracts, homeopathic treatment, special forage crops, improved pasture species like Lotus pedunculatus, which has a high condensed tannin content, and rational grazing management (moving stock to uninfected areas or diluting strategies by alternating or mixing species on the same grassland) can all help to slow these issues.

Production drop and Cost concern: According to studies conducted worldwide, organic dairy cattle produce 10-18%

less milk than conventional dairy cow, but they can produce significantly more under ideal circumstances. Due to feed restrictions, organic dairy cows may be less nutritious. This worry was allayed by numerous investigations that identified no appreciable health disparities. Milk production decreased in the early years of organic dairy production. Farmers in India would not be able to withstand the slight output loss due to the lower productivity of native animals and the presence of small dairy owners, which could discourage them from converting. The fact that producing organic dairy involves extra work is another problem. Organic farms need 10-20% more work than conventional farms. Costly organic inputs are also typical. Though most organic farming systems have lower overall expenses than equivalent conventional farms, they need more labor to manage the same number of hectares or cows, hence net market revenue per unit of labor may not be greater. Increasing consumer willingness to pay higher prices, cutting expenses with a more established market chain, as well as providing farmers with subsidies during periods of production loss.

Lack of organic farming knowhow and proper training:

The majority of technical assistance is concentrated on boosting productivity per unit input and time because decades of chemical-based farming have decimated indigenous technological knowledge bases in the majority of developing countries. The negative impacts of inorganic agriculture products are likewise not well marketed. The promotion of organic dairy farming is hampered by Indian farmers' lack of knowledge about the challenges of organic agriculture. There is insufficient training about organic dairy production standards and methods. This gap, which is typically brought about by a lack of qualified employees in extension and training organizations, may close as Indian farmers use ICT more.

Opportunities

Consumer awareness and demand for healthy food:

Organic goods have been more expensive over the last decade due to lifestyle choices and process quality. Consumer interest in organic farming tends to be driven by health, environmental effect, and animal welfare. Organic dairy products are in demand in the US, EU, Japan, Argentina, and Brazil due to rising per capita income, lifestyle changes, and eating preferences. Literacy is rising and media are raising consumer awareness of animal welfare and healthful diets. This may increase domestic organic food consumption.

Grass or crop residue based feeding: The majority of cattle in India are raised by small, marginal farmers with limited resources. The main foods given to animals are straw and grasses. Animals in rural India consume naturally occurring grasses and shrubs with low protein and calorie content because fodder production is uncommon. Their reliance on seasonal fluctuations has a year-round impact on the milk supply. In rural India, 40-60% of the dry matter consumed by animals comes from crop waste. Growing more legumes would improve feed quality and offer other advantages because integrated and well-diversified crop livestock husbandry is more prevalent. Commercial concentrates are less necessary when home-grown protein-rich concentrates like beans and peas are used. Annual

legumes that self-seed could be advantageous for organic and low-input farming systems. To improve grasslands, prevent grazing and introduce extremely nutritious grasses. Involve the well-developed and powerful Indian local Panchayat system.

Protecting and enhancing bio diversity and positive

social impact: Organic farming generates microbial energy and is ecologically beneficial. Beneficial insects have been destroyed by chemicals, which have also damaged the ecology. Organic livestock farmers must manage manure to prevent crop, soil, and water pollution and maximize nutrient recycling. This will help restore biodiversity in green revolution regions and preserve natural resources in other farming-dominated areas. Organic dairy farming has societal benefits in rural areas.

For a few organic growers in Higher living standards are the main benefit in developing countries like China and India. Organic farming results in lower unemployment, better product prices, fewer chemical health issues, and a decline in rural emigration.

Threats

Foreign market dependence: Due to poor hygienic conditions, diseases, traceability problems, and self-sufficiency in importing nations, organic dairy products are dangerous to trade globally and may discourage Indian producers. Political constraints on agricultural imports from developing countries are a significant limiting factor due to the low local demand and price premium.

Polluted natural resources: For decades, over use of pesticides and fertilizers has deteriorated water, soil, and other natural resources. India uses fewer pesticides than other developed nations, but it still has a problem with pesticide residues. Fodder, animal feed concentrates, milk, eggs, meat, and human food have all been contaminated by excessive pesticide application (Prasad and Chhabra, 2001). In milk samples from high-chemical agricultural regions like Punjab, Haryana, Uttar Pradesh, etc., pesticide residue declined but did not completely disappear. Dairy products and other high-fat meals include less common, fat-soluble organophosphorus insecticides such as acephate, diazinone, phorate, chlorpyrifos, and malathion. Only a few Ganga samples showed quinalphos, parathion-methyl, and ethion, whereas ground water samples from UP regions had malathion and monocrotophos. Pesticides, mercury, lead, cadmium, and arsenic are regularly discovered in Indian milk samples. Even while organic milk contains less pesticide residue than normal milk, improper use could contaminate it with environmental pollutants. These chemicals should be avoided by organic and nearby crops.

Organic dairy farming standard: India lacks a well-developed framework to supervise organic dairy production, which must fulfill tight rules. Given the unique peculiarities of Indian dairy producers, blindly following western organic dairy standards is impossible.

Fodder shortage: India needs 1097 million tonnes of green and 609 million tonnes of dry feed, but only 400.6 and 466 million tonnes are available. The shortfall of 63.50% and 23.56% of green and dry fodder versus actual demand would expand to 64.21% and 24.81% by 2020. Farmers will

likely not be able to acquire additional fodder land due to population pressure and land scarcity. Over time, available grazing pastures likewise decrease. Thus, the green fodder deficit may worsen.

Conclusion

Dairy farming techniques are expected to provide milk, preserve the environment, care for animals, and increase biodiversity. Indigenous cow farming knowledge, biodiversity, cheap labor, reduced organic dairy farming expenses, and an unexplored huge domestic market make organic dairy production a feasible option for Indian dairy farmers. But its tight standards make widespread adoption impossible. Indian farmers must use their advantages to overcome obstacles. Farmers can participate in organic production and benefit the environment, livestock, and people with successive capacity and knowledge building, certifying organizations, and organic dairy product promotion to increase consumer awareness of organic products, their environmental friendliness, and their ability to maintain natural resource quality. Strong government regulations for organic farming and genuine implementation by everybody are necessary to overcome past challenges. stakeholders.

References

- Anderson BH, Magdoff FR. Dairy farm characteristics and managed flows of phosphorus. *Am J Altern Agric*. 2000;15(1):19-25.
- Augustine AJ, Jokthan GE, Zarafi IC, Bivan GM. Optimizing opportunities for sustainable development through organic agriculture in Nigeria. *J Agric Vet Sci*. 2013;4:7-11.
- Bansal OP, Gupta R. Groundwater quality of Aligarh district of Uttar Pradesh. *Pestic Res J*. 2000;12:188-194.
- Barbuddhe SB, Swain BK. Hygienic production of milk: Technical Bulletin No. 11. Goa: ICAR, Animal Science Section; 2008. 17 p.
- Bello WB. Problems and prospect of organic farming in developing countries. *Ethiop J Environ Stud Manag*. 2008;1:36-43.
- Bengtsson J, Ahnstrom J, Weibull AC. The effects of organic agriculture on biodiversity and abundance: a meta-analysis. *J Appl Ecol*. 2005;42:261-269.
- Butterworth J, Adolph B, Reddy BS. How farmers manage soil fertility? A guide to support innovation and livelihoods. Hyderabad: Andhra Pradesh Rural Livelihoods Programme; 2003.
- Caporali F, Campiglia E. Increasing sustainability in Mediterranean cropping systems with self-reseeding annual legumes. In: Gliessman SR, editor. *Agroecosystem sustainability*. New York: CRC Press LLC; 2001. p. 15-27.
- Chander M. Organic livestock production in India: why, how and road ahead. In: Shetty PK, Alvares C, Yadav AK, editors. *Organic farming and sustainability*. Bangalore: National Institute of Advanced Studies; 2014. p. 51-67.
- Chander M, Subrahmanyeswari B. Organic livestock farming. New Delhi: Directorate of Knowledge Management in Agriculture, ICAR; 2013. 293.
- Chander M, Subrahmanyeswari B, Mukherjee R. Organic animal husbandry. In: *Handbook of animal husbandry*. New Delhi: Directorate of Knowledge Management in Agriculture, ICAR; 2013. p. 365-382.
- Chander M, Subrahmanyeswari B, Mukherjee R, Kumar S. Organic livestock production: an emerging opportunity with new challenges for producers in tropical countries. *Rev Sci Tech*. 2011;30:969-983.
- Devendra C. Meeting the increased demand for animal products in Asia: opportunities and challenges for research [Internet]. 2003 [cited 2026 May 10]. Available from: <http://www.bsas.org.uk>
- Dwivedi SK, Dey S, Swarup D, Patra RC. Lead poisoning in cattle and buffalo near primary lead-zinc smelter in India. *Vet Hum Toxicol*. 2001;43:93-94.
- Fuller RJ, Norton LR, Feber RE, Johnson PJ, Chamberlain DE, Joys AC, *et al*. Benefits of organic farming to biodiversity vary among taxa. *Biol Lett*. 2005;1:431-434.
- Gabriel D, Roschewitz I, Tschamntke T, Thies C. Beta diversity at different spatial scales: plant communities in organic and conventional agriculture. *Ecol Appl*. 2006;16:2011-2021.
- Gabriel D, Sait SM, Hodgson JA, Schmutz U, Kunin WE, Benton TG. Scale matters: the impact of organic farming on biodiversity at different spatial scales. *Ecol Lett*. 2010;13:858-869.
- Gangadharan R. Rinderpest-A devastating ancient disease: Indian experiences and lessons learned. In: *Lessons learned from the eradication of rinderpest for controlling other transboundary animal diseases*. Rome: FAO; 2010. p. 67-69.
- Ghosh SK. Scope of integrated organic farming in India with special reference to North Eastern States. In: *Organic animal husbandry, concept, standards & practices*. Izatnagar: Division of Extension Education, IVRI; 2006. p. 54-56.
- Hermansen JE. Organic livestock production systems and appropriate development in relation to public expectations. *Livest Prod Sci*. 2003;80:27-39.
- Hole DG, Perkins AJ, Wilson JD, Alexander IH, Grice PV, Evans AD. Does organic farming benefit biodiversity? *Biol Conserv*. 2005;122:113-130.
- Howieson JG, O'Hara GW, Carr SJ. Changing roles for legumes in Mediterranean agriculture: developments from an Australian perspective. *Field Crops Res*. 2000;65:107-122.
- International Fund for Agricultural Development. Rural poverty report 2011: New realities, new challenges, new opportunities for tomorrow's generation [Internet]. Rome: IFAD; 2010 [cited 2026 May 10]. Available from: <http://www.ifad.org/rpr2011/report/e/rpr2011.pdf>
- Institute of Food Science and Technology (UK). Organic food [Internet]. 2001 [cited 2026 May 10]. Available from: <http://www.ifst.org/>
- Ivey MC, Dehler DO, Claborn HW. Gas liquid chromatography determination of chlorfenvinphos in milk, egg and body tissues of cattle and chicken. *J Agric Food Chem*. 1973;21:822-824.
- Jakobsen K, Hermansen JE. Organic farming—a challenge to nutritionists. *J Anim Feed Sci*. 2001;10(Suppl 1):29-42.
- Kamboj ML, Prasad S. Organic dairy farming in India: prospects, practices and constraints. In: *New paradigms in livestock production from traditional to commercial*

- farming and beyond. Udaipur: Agrotech Publishing Academy; 2013. p. 634-647.
28. Kamboj ML, Rai S, Prasad S, Datt C, Harika AS, Kumar N, *et al.* A technical bulletin on organic dairy farming. Karnal: National Dairy Research Institute; 2013. 36 p.
 29. Kouba M. Quality of organic animal products. *Livest Prod Sci.* 2003;80:33-40.
 30. Kristensen T, Mogensen L. Danish organic dairy cattle production systems—feeding and feed efficiency. In: Hermansen JE, Lund V, Thuen E, editors. *Ecological animal husbandry in the Nordic countries*. Tjele: DARCOF; 2000. p. 35-40.
 31. Kumar N, Sawant S, Malik RK, Patil G, inventors. Development of analytical process for detection of antibiotic residues in milk using bacterial spores as biosensors. Indian Patent IPR/4.9.1.41. 2006.
 32. Loes AK, Ogaard AF. Long-term changes in extractable soil phosphorus (P) in organic dairy farming systems. *Plant Soil.* 2001;236:321-332.
 33. Lund V, Rocklinsberg H. Outlining a conception of animal welfare for organic farming systems. *J Agric Environ Ethics.* 2001;14:391-424.
 34. Maruejouis B, Goulard F. Residus de pesticides dans le lait. *Altern Agric.* 1999;37:10-13. In: Singh SP, *et al.* *Organic dairy farming: a novel approach in dairy sector*. *Int J Livest Res.* 2014;4:10-19.
 35. Meena MS, Singh KM. Fodder production scenario and strategies for revitalizing fodder production technologies [Internet]. Munich Personal RePEc Archive (MPRA); 2014 [cited 2026 May 10]. Available from: <http://mpra.ub.uni-muenchen.de/56367/>
 36. Mendoza TC. Comparative productivity, profitability and energy use: intensity and efficiency of organic, LEISA and conventional rice production in the Philippines. In: *Proceedings of the 14th IFOAM Organic World Congress*; 2002 Aug 21-24; Victoria, Canada. p. 37-39.
 37. Misra AK, Rama Rao CA, Subrahmanyam KV, Ramakrishna YS. Improving dairy production in India's rain-fed agroecosystem: constraints and strategies. *Outlook Agric.* 2009;38:284-292.
 38. Mohapatra SP, Gajbhiye YT, Agnihotri NP. OP insecticide residues in the aquatic environment of a rural area. *Pestic Res J.* 1994;6:157-160.
 39. Nardone A, Zervas G, Ronchi B. Sustainability of small ruminant organic systems of production. *Livest Prod Sci.* 2004;80:3-15.
 40. Ministry of Commerce and Industry. National Programme for Organic Production (NPOP). New Delhi: Govt. of India; 2005. 226 p.
 41. Ortiz EME, Hue NV. Current developments in organic farming [Internet]. Research Signpost; 2007 [cited 2026 May 10]. Available from: <http://www.ctahr.hawaii.edu/huen/organic%20farming.pdf>
 42. Oruganti M. Organic dairy farming-A new trend in dairy sector. *Vet World.* 2011;4:128-130.
 43. Padel S. Strategies of organic milk production. In: Hovi M, Bouilhol M, editors. *Proceedings of the 3rd NAHWOA Workshop*; 2000 Oct; Clermont-Ferrand. Reading: University of Reading; 2000. p. 121-135.
 44. Patra AK. Nutritional management in organic livestock farming for improved ruminant health and production—an overview. *Livest Res Rural Dev.* 2007;19(3).
 45. Planning Commission. Draft report of working group on animal husbandry and dairying for five-year plan (2002-2007). New Delhi: Govt. of India; 2001. p. 44-46.
 46. Prasad KSN, Chhabra A. Organochlorine pesticides in animal feeds and fodders. *Indian J Anim Sci.* 2001;71:1178-1180.
 47. Ronchi B, Nardone A. Contribution of organic farming to increase sustainability of Mediterranean small ruminants livestock systems. *Livest Prod Sci.* 2003;80:17-31.
 48. Setboonsarng S. Organic agriculture, poverty reduction and the millennium development goals. ADB Institute Discussion Paper No. 54. Tokyo: ADBI; 2006.
 49. Singh AK. Conversion to organic agriculture. Lucknow: International Book Distributing Co.; 2007.
 50. Singh SP, Ghosh S, Lakhani GP, Jain A, Roy B, Tiwari DK. Organic dairy farming: a novel approach in dairy sector. *Int J Livest Res.* 2014;4:10-19.
 51. Sreeram V, Gupta J. Kaheerasamruddhi—An innovative dairy value chain model from Kerala. *Indian Dairyman.* 2016;68:62-65.
 52. Sundrum A. Organic livestock farming: a critical review. *Livest Prod Sci.* 2001;67:207-215.
 53. UNCTAD. Make agriculture truly sustainable now for food security in a changing climate [Internet]. UN Publication; 2013 [cited 2026 May 10]. Available from: http://unctad.org/en/publicationslibrary/ditcted2012d3_en.pdf
 54. Willer H, Kilcher L, editors. *The world of organic agriculture: statistics and emerging trends 2011*. Bonn: IFOAM; 2011.