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REVIEW

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# Harmony in Cultivation: Embracing Organic Farming for Healthier Ecosystems, Animals, and Communities

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**Conflict of Interest**

The authors declare that the manuscript was formulated in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Authors Contribution**

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## Abstract

Organic dairy production and farming, regulated by entities such as India's National Programme for Organic Production (NPOP), emphasize ecological balance and animal well-being. This article explores the purpose, importance, and protocols of organic dairy farming, highlighting the requirements and procedures essential for certification. It delves into standard operating procedures (SOPs) for dairy farms, organic fodder cultivation, clean milk production, complementary practices to vaccination, and immunity-enhancing organic feeds for dairy cows. Additionally, it examines the zero use of chemical fertilizers and pesticides in fodder cultivation and outlines the adverse effects of conventional practices. The review emphasizes the shift toward organic alternatives and their impact on human health, environmental sustainability, and animal welfare.

## KEYWORDS

Organic dairy production, immunity enhancement, chemical alternatives, adverse effects, organic alternatives.

## INTRODUCTION

Organic dairy farming aligns with regulations such as India's NPOP, prioritizing environmental sustainability, animal welfare, and human health. The purpose encompasses minimizing soil degradation, reducing pollution, promoting biodiversity, and enhancing soil health. Importantly, this practice ensures better living conditions for dairy cows, offering access to pasture, organic feed, and reducing reliance on antibiotics. The growing consumer demand for organic dairy products stems from increased awareness of environmental and health concerns. Concurrently, organic farming contributes to long-term agricultural sustainability, focusing on soil health, biodiversity, and resource conservation.

## PURPOSE AND IMPORTANCE OF ORGANIC DAIRY PRODUCTION AND ORGANIC FARMING

Organic dairy production, governed by regulations like India's National Programme for Organic Production (NPOP), prioritizes ecological balance and animal welfare.

Purpose:

- Environment: Minimizes soil degradation, reduces pollution from synthetic fertilizers and pesticides, promotes biodiversity, and improves soil health
- Animal Welfare: Ensures better living conditions for dairy cows with access to pasture, organic feed, and less reliance on antibiotics.
- Human Health: May offer potential benefits like higher levels of beneficial fatty acids in milk and reduced pesticide exposure for consumers.

Importance:

- Growing consumer demand: Organic dairy products experience consistent market growth due to increased consumer awareness of environmental and health concerns.
- Sustainability: Contributes to long-term agricultural sustainability by promoting soil health, biodiversity, and resource conservation

## GROWING INTERESTS AMONG PEOPLES TOWARDS ORGANIC PRODUCTION IN THE CURRENT ERA

- Increased health awareness: Consumers are more conscious of the potential health benefits of organic food and the concerns surrounding pesticide residues and antibiotic use.
- Environmental concerns: Growing awareness of climate change and environmental degradation drives consumers towards sustainable food choices like organic products.
- Transparency and ethical concerns: Consumers seek transparency in food production and may prefer organic products due to higher welfare standards for animals and perceived ethical practices.
- Government support: The Indian government has implemented various initiatives to promote organic farming, such as the Paramparagat Krishi Yojana Scheme, providing financial assistance and infrastructure support to farmers

## EQUIREMENTS/PROTOCOLS TO HAVE AN ORGANIC DAIRY FARM AND ORGANIC

## AGRICULTURE FARM:

Speaking as per Indian scenario, establishment of an organic dairy farm in India requires adherence to the NPOP's strict regulation. Key requirements include:

- Certification: Farms must follow specific organic standards and regulations set by certifying body - NPOP. These standards cover aspects like feed, animal welfare, pest control, land management, and record-keeping.
- Feed: Cows must be fed 100% organic feed, including pasture, hay, and silage grown without synthetic fertilizers and pesticides. Genetically modified organisms (GMOs) are prohibited.
- Animal welfare: Access to pasture and outdoor exercise is mandatory, along with restrictions on the use of antibiotics and preventive medication. Calves must be allowed to nurse their mothers.
- Land management: Farms must implement crop rotation, composting, and other practices to promote soil health and biodiversity. Synthetic fertilizers and pesticides are prohibited.
- Record-keeping: Detailed records of feed, animal health, and land management practices are required for certification purposes.

## CREATING A STANDARD OPERATING PROCEDURE (SOP) FOR AN ORGANIC DAIRY FARM

Milking Procedures

Prepare by sanitizing udders, teats, and equipment. Employ proper hygiene techniques for hand or machine milking. Ensure milk storage through proper labeling, chilling, and storage methods.

Feeding Protocol

Utilize organic feed, considering sourcing, storage, and distribution. Implement specific feeding schedules and dietary needs for different animals.

Healthcare and Veterinary Procedures

Schedule regular veterinary visits, health assessments, and immunity enhancement through organic feed. Develop protocols for treating sick animals within organic standards.

Pasture Management

Plan rotational grazing schedules, maintain pastures, and focus on soil health. Use organic fertilizers and natural methods for pasture improvement.

Facility Maintenance

Sanitize barns, milking parlors, and equipment. Regularly maintain fences, housing, and water systems.

Record-Keeping

Maintain daily logs of milk production, animal health, and feed consumption. Document adherence to organic certification standards.

Environmental Impact Measures

Implement waste management protocols and eco-friendly practices to minimize environmental impact.

Employee Training

Educate staff on organic farming principles, animal care, and safety protocols. Ensure proper handling of animals and machinery to prevent accidents.

Emergency Procedures

Develop protocols for natural disasters, disease outbreaks, or accidents. Establish clear guidelines for reporting emergencies.

Compliance with Regulations

Ensure alignment with organic farming standards and regulations. Maintain up-to-date records for inspections and audits.

Continuous Improvement

Encourage staff feedback for process enhancement. Regularly evaluate SOPs for updates and improvements.


Figure 1: Organic Dairy Farming Protocols

## STANDARD OPERATING PROCEDURE (SOP) FOR ORGANIC FODDER CULTIVATION

Land Preparation and Planning

Conduct soil tests for nutrient analysis. Plan crop rotations to maintain soil fertility.

Seed Selection and Sowing

Source certified organic seeds suitable for fodder crops. Follow recommended seeding rates and depth for each crop.

Organic Soil Management

Utilize organic compost and manure for soil enrichment. Implement mulching or green manure practices.

Water Management

Use efficient irrigation systems and implement rainwater collection methods where feasible.

Weed and Pest Management

Utilize organic weed control methods and natural pest control if necessary.

Harvesting and Storage

Harvest at the optimal growth stage. Use organic methods for haymaking or silage production.

Record Keeping and Documentation

Maintain detailed records of crop rotations, inputs used, and yields. Document adherence to organic certification standards.

Continuous Improvement and Learning

Regularly assess crop performance and soil health. Stay updated with organic farming best practices.

## CLEAN MILK PROCEDURE FOR DAIRY FARMING

Preparation of Milking Area

Thoroughly clean and sanitize milking equipment and surfaces. Ensure proper personal hygiene.

Milking Process

Inspect cows for health issues. Employ hygienic milking techniques to minimize stress. Prevent milk contamination.

Milk Handling and Storage

Rapidly cool milk for freshness. Use clean, food-grade containers with proper labeling.

Cleaning and Maintenance of Equipment

Thoroughly clean and sanitize milking equipment after each use. Schedule routine inspections and maintenance.

Quality Control and Testing

Conduct periodic milk quality tests. Take prompt action if quality issues arise.

Record Keeping

Maintain detailed records of milk yield and quality tests. Document adherence to organic or regulatory standards.

Continuous Training and Improvement

Educate workers on proper milking techniques and hygiene. Encourage feedback for procedure improvement.

## COMPLEMENTARY TO VACCINATION

Nutritional Supplements

Ensure organic trace minerals and herbal supplements in feed for immune support.

Homeopathy and Herbal Remedies

Utilize homeopathic treatments and herbal remedies for specific health issues.

Probiotics and Prebiotics

Incorporate organic probiotics and prebiotics for gut health and immunity.

Holistic Health Management

Minimize stress and maintain clean, well-ventilated spaces for animals.

## BENEFITS OF ETHNO-VETERINARY PRACTICES

Traditional Knowledge Preservation

Preserve cultural heritage and local wisdom through ethno-veterinary practices.

Accessibility and Affordability

Provide low-cost and accessible remedies, particularly in remote areas.

Sustainability and Environment

Reduce environmental impact and promote sustainable livestock farming.

Holistic Approach to Animal Health

Focus on preventative care and overall animal well-being.

Community Empowerment and Ownership

Empower communities for self-sufficiency in livestock care.

Potential for New Discoveries

Offer opportunities for research and new treatments.

Integration with Modern Medicine

Explore traditional practices for modern pharmaceutical developments.

Reduced Dependency on Antibiotics

Offer alternatives to antibiotics, reducing antibiotic resistance.

## IMMUNITY ENHANCING ORGANIC FEEDS FOR DAIRY COWS

Probiotics and Prebiotics

Utilize organic sources like fermented feed and prebiotics such as chicory.

Organic Vitamins and Minerals

Source organic vitamins and minerals from various organic sources.

Omega-3 Fatty Acids

Incorporate organic sources like flaxseed or algae for omega-3 supplementation.

Organic Beta-Glucans

Utilize organic oats, barley, or mushrooms high in beta-glucans.

Essential Amino Acids from Organic Sources

Source organic lysine and methionine from soybean meal or other sources.

Organic Herbs and Plant Extracts

Incorporate organic immune-supporting herbs like echinacea and garlic.

Organic Yeast Products

Utilize organic yeast cell wall components derived from yeast cultures.

Organic Antioxidants

Source organic polyphenols from berries or apple pomace.

Organic Mushroom Extracts

Incorporate immune-boosting properties from organic mushrooms.

Certified Organic Balanced Nutrition

Ensure a well-balanced certified organic diet for dairy cows.

## ZERO USE OF CHEMICAL FERTILIZERS, PESTICIDES, AND INSECTICIDES IN FODDER AND FORAGES CULTIVATION THROUGH THE USE OF ORGANIC FERTILIZERS

A. Uses and Adverse Effects of Fertilizers, Pesticides, and Insecticides

1. Human effects

a. Fertilizers

i. Nitrogen and Phosphorous:

Higher use of nitrogen fertilizer increases the loss of reactive nitrogen to the environment by about 5 times. Excessive use leads to the alteration of nutrient cycles and reduced nitrogen use efficiency (NUE) in the Indian food system.

ii. Pesticides: Organophosphorus:

Pesticides like malathion, parathion, and dimethoate exhibit endocrine-disrupting potential, affect cholinesterase enzymes, decrease insulin secretion, and disrupt normal cellular metabolism, causing cellular oxidative stress. These pesticides may also have genotoxic effects and adverse impacts on the nervous and endocrine systems.

iii. Glyphosate:

Glyphosate demonstrates endocrine-disrupting activity, affecting human erythrocytes in vitro, and promoting carcinogenicity in mouse skin.

iv. Carbamate Phosphate:

Carbamate pesticides like aldicarb, carbofuran, and ziram show endocrine-disrupting activity, possibly leading to reproductive disorders and affecting cellular metabolic mechanisms and mitochondrial function.

b. Insecticides

DDT: DDT exhibits neurodevelopmental effects in children and, in combination with p,p-dichlorodiphenyldichloroethylene (DDE), may have endocrine-disrupting potential and carcinogenic action.

2. Environmental Effects:

a. Soil

Heavy metals like Hg, Cd, As, Pb, Cu, Ni, and Cu in the soil affect groundwater and plant growth.

b. Aquifer

Heavy metal traces decrease as we move deeper down the aquifer. Nitrate nitrogen, chloride, sulfate, and atrazine are increasing at an alarming rate in water tables, potentially causing methemoglobinemia in infants and stomach cancer in adults.

c. Effect on Animal Feeds

i. Pesticides Effect on Poultry Feed:

Poultry feed samples (maize grains, soybean, groundnut cake, sunflower cake, concentrate feed mixture) were contaminated with HCH, DDT, Aldrin, Carbendazine, and Thiram.

ii. Feed and Fodder Contamination:

HCH, DDT, Aldrin, and Endosulphan were traceable in feed and fodder.

B. Organic Alternatives for Food and Fodder Cultivation

Bio-Fertilizer

i. Nitrogen-Fixing Micro-organisms:

Symbiotic (Rhizobium, Azolla) and Non-Symbiotic (BGA, Azotobacter, Azosprillum) microorganisms.

ii. Phosphorus Solubilizing Micro-organisms:

Symbiotic (VAM) and Non-Symbiotic (Fungi, Bacteria) microorganisms.

Examples include Rhizobium leguminosarum, Pseudomonas putida, Azosprillumbrasilense, Azotobacter, Azosprillumspp, P. alcaligenes, Bacillus polymyxa, Mycobacterium phlei, Pseudomonas, Bacillus, and Rhizobium species, which contribute to improving nutrient uptake and stimulating growth in various crops.

Bio-Pesticides

Utilization of neem or vasaka leaves, cow dung, cow urine, death craves, cow and goat stomachs, and insect-repellent crops like onion, garlic, and sunflower.

This organic approach mitigates the adverse effects caused by chemical fertilizers, pesticides, and insecticides, promoting sustainable agriculture and safer animal feed production.

## CONCLUSION

Organic dairy production and farming, guided by strict regulations and protocols, offer multifaceted benefits. The adherence to NPOP standards necessitates certification, emphasizing organic feed, animal welfare, land management, and meticulous record-keeping. Standard operating procedures for dairy farms and organic fodder cultivation outline crucial steps in milking procedures, feeding protocols, healthcare measures, and environmental impact mitigation. Clean milk production practices ensure hygiene, quality, and adherence to organic or regulatory standards. Complementary vaccination practices and immunity-enhancing organic feeds underscore the holistic approach to animal health. Additionally, the transition from chemical fertilizers and pesticides to organic alternatives is imperative due to adverse effects on human health, the environment, and animal feeds.

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