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Organic livestock farming

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Abstract
Organic farming is aimed to promote animal health and environment sustainability through holistic management for positive health. It promotes biodiversity, biological cycles and soil health. The practice aims to protect human health and conserve, maintain or enhance natural resources, with the goal to preserve the quality of the environment for future generations while being economically sustainable. Organic farming has grown rapidly throughout the world in recent years.
Organic production is knowledge and management intensive. Producers must be well versed in organic production standards, principles and practices, which require a high degree of knowledge and skill. Animal production is an important part of organic farming that aims at achieving a balanced relationship between the soil, plants and the animals in a farming system. Each component is as important as the other in contributing to the overall effect and in fulfilling the key values of naturalness, harmony, local circulation of resources and the principle of precaution.
Organic livestock farming means raising animals on organic feed and providing access to pasture, along with the restricted usage of antibiotics and hormones. While organic livestock producers use minerals and vitamins as feed additives, most rely on cultural practices to maintain animal health. Most veterinary medicines are prohibited.

Keywords: organic farming, livestock, holistic management

1. Introduction

Organic farming is aimed to promote animal health and environment sustainability through holistic management for positive health. It promotes biodiversity, biological cycles and soil health [1].The practice aims to protect human health and conserve, maintain or enhance natural resources, with the goal to preserve the quality of the environment for future generations while being economically sustainable. As applied to the organic livestock sector, it generally means that: – Organic milk, meat, poultry and egg products come from farms that have been inspected to meet strict standards which mandate the use of organic feed, prohibit the use of antibiotics, give animals access to outdoors, fresh air and sunlight. Production methods are selected based on criteria that meet all health regulations, work in harmony with the environment, build biological diversity and foster healthy soil and growing conditions.
The first guidelines for organic farming were developed as early as 1924 in order to elaborate an alternative to conventional production [37]. The industrialization of agriculture during the last 40–50 years has increased the interest in organic farming. Different ideologies and ideas within Europe have contributed to a common basis for organic farming as it is known today. The overall objectives of organic agriculture are described in the basic standards formulated by the International Federation of Organic Agriculture Movements (IFOAM) [17].
Livestock plays an important role in relation to the general principles of organic agriculture, supporting biological cycles within the farming system and diversifying production [17]. However, only 3 of the 17 standards set by the IFOAM specifically refer to organic livestock farming. These are (i) maintenance of biodiversity (ii) provision of freedom and access to natural behavior by livestock and (iii) promotion of a balanced mix of crop and livestock production, leading to closed and sustainable nutrient cycles.
Nutrient management in organic farming systems is often based on soil fertility building via nitrogen (N) fixation and nutrient recycling of organic materials, such as farmyard manure and crop residues, with limited inputs from permitted fertilizers [11]. Although organic farming has been criticized for relying on the build-up of soil phosphorus (P) and potassium (K) by past fertilization before converting to organic [27], its acceptance and popularity are growing due mostly to environmental and health related concerns [3].

A shift to organic agriculture brings about significant changes: restricted use of synthetic fertilizers and pesticides, increases of other inputs such as organic materials, cultural practices (e.g., crop rotation), and better knowledge of biological processes. These changes have serious implications. Thus, farmers should consider the following issues before practicing organics [10].

2. Definition of organic farming

There are many definitions of organic farming, which is also known as ecological agriculture [12] or biodynamic agriculture [23]. Some have considered organic farming and sustainable agriculture synonymous, because they are both based on sustainability of agro-ecological systems. Sustainability can be defined as meeting the need of the present without compromising the ability of future generations [38]. The word "organic" is legally protected in some countries, avoiding their indiscriminate use in non-organic products.

Organic farming according to[16] is both a philosophy and a system of farming, grounded in values that reflect an awareness of ecological and social realities and the ability of the individual to take effective actions. In practice, it is designed to work with natural processes to conserve resources, encourage self-regulation through diversity, to minimize waste and environmental impacts, while preserving farm profitability.

According to [22], the aim of organic farming is: “to create integrated, humane, environmentally and economically sustainable production systems, which maximize reliance on farm-derived renewable resources and the management of ecological and biological processes and interactions, so as to provide acceptable levels of crop, livestock and human nutrition, protection from pests and disease, and an appropriate return to the human and other resources”. As such, organic farming shares the fundamental objectives of agricultural sustainability and is deserved to be assessed as a mainstream part of sustainable agriculture [8]. IFOAM has defined organic agriculture as “a process that develops a viable and sustainable agro ecosystem”. In practical terms, organic farming is a form of agriculture that shies away from synthetic inputs such as pesticides and fertilizers (because of their negative effects on the ecological balance) but uses agricultural practices such as crop rotation, proper spacing between plants, incorporation of organic matter into the soil, and composting [20]. With restrictions on the use of chemical fertilizers, the principal challenge to converting a conventional farm to an organic one is to provide N, K (because these two elements are required at rather large quantities by most crops and because they are easily leached from soils), and to a lesser extent, other plant nutrients at rates and times to ensure acceptable crop yields [34].

3. Organic farming- Indian scenario

Organic farming was practiced in India since thousands of years and one of the most prosperous countries in the world. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position in agricultural land under organic crops to total farming area.

India produced around 1.35 million Mt (2015-16) of certified organic products including all varieties of food and food products namely cotton, basmati rice, pulses, honey, tea, spices, coffee, oil Seeds, fruits, processed food, cereals, herbal medicines and their value added products

Indian agriculture is characterized by small scale (<2 ha), subsistence farming operations under low input low output production systems, where, livestock are essentially integrated with crop farming. Thus, alongside organic crop production, the prospects for organic livestock production are bright though yet to be explored [5].

4. The status of organic production in India

Table 1

Total area under certified organic cultivation	**5.71 M ha**
Total production	1.35m Mt
Total quantity exported	0.26m Mt
Value of total export	298 million USD
Number of farmers	2.3 million

Source: Ofai.org (2015-16)

In India only 30 percent of the total cultivable area is covered with fertilizers where irrigation facilities are available and in the remaining 70 percent of arable land, which is mainly rain-fed, negligible amount of fertilizers is being used. Farmers in these areas often use organic manure as a source of nutrients that are readily available either in their own farm or in their locality. India has around 15,000 certified organic farms, which produces 1.35 million MT of output annually.

The Indian states involved in organic farming are as follow:-

- Gujarat
- Kerala - Karnataka
- Uttaranchal
- Sikkim
- Rajasthan
- Maharashtra
- Tamil Nadu
- Madhya Pradesh
- Himachal Pradesh

The northeastern region of India provides considerable opportunity for organic farming due to least utilization of chemical inputs. It is estimated that 18 million hectare of such land is available in the North East, which can be exploited for organic production. With the sizable cultivated land under naturally organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic products in the world’s organic market [7].

5. Overview of organic farming

Organic farming has expanded rapidly in recent years and is seen as a sustainable alternative to chemical-based agricultural systems [2][3]. Its annual growth rate has been about 20% for the last decade [25], accounting for over 31 million hectares (ha) and generating over 26 billion US dollars in annual trade worldwide [43]. Nutrient management in organic farming systems is often based on soil fertility building via nitrogen (N) fixation and nutrient recycling of organic materials, such as farmyard and crop residues, with limited inputs from permitted fertilizers [11]. A recent polling of residents of Ontario, Canada reveals that more than half think organic food is more nutritious; two-thirds believe organic food is safer than conventionally grown food; and 9 out of 10 believe organic fruits and vegetables are grown without pesticides of any kind [2].

The aims and principles of organic farming, as presented in the International Federation of Organic Agriculture Movements (IFOAM) Basic Standards for production and processing.

A shift to organic agriculture brings about significant changes: restricted use of synthetic fertilizers and pesticides,

increases of other inputs such as organic materials, labor, perhaps machinery, cultural practices (e.g., crop rotation), and better knowledge of biological processes. These changes have serious implications.

6. Aims of organic production and processing [18]

- To produce food of high quality in sufficient amount.
- To interact in a constructive and life- enhancing way with natural system and cycles.
- To consider the wider social and ecological impact of organic production and processing system.
- To encourage and enhance biological cycles within the farming system, involving microorganisms, soil flora and fauna, plants and animals.
- To maintain and increase long- term fertility of soils.
- To maintain the genetic diversity of the production system and its surroundings, including the protection of plants and wild life habitats.
- To promote the healthy use and proper care of water and water resources and all life therein.
- To use as far as possible, renewable resources in locally organized production systems.
- To create a harmonious balance between crop production and animal husbandry.
- To give all livestock conditions of life with due consideration of the basic aspects of their innate behavior.
- To minimize all forms of pollution.
- To process organic products using renewable resources.
- To produce fully biodegradable organic products.
- To allow everyone involved in organic production and processing in a quality of life that meets their basic need and allows an adequate return and satisfaction from their work, including a safe working environment.
- To progress toward an entire production, processing and distribution chain which is both socially just and ecologically responsible.

7. Characteristics of organic livestock production systems

Organic livestock management shall aim to utilize natural breeding methods, minimize stress, prevent disease, progressively eliminate the use of chemical allopathic veterinary drugs (including antibiotics), and maintain animal health and welfare. Some key considerations in organic animal husbandry that producers and other stakeholders need to take into account are listed below:

- Origins of livestock
- Livestock feed
- Living conditions
- Waste management
- Health care regulation
- Record keeping

7.1 Origin of livestock

All livestock and livestock products that are sold, labeled or advertised as organic must be raised under continuous organic management from the last third of gestation or at hatching.

7.2 Livestock feed

The total ration of livestock that are produced under organic management must consist of agricultural products that have been organically produced and handled organically. This includes pasture, forage and crops. Avoid use of plastic pellets, urea, manure and by-products from mammalian or poultry slaughter are not allowed.

7.3 Living condition and regulation for organic dairy farming

An organic livestock producer must create and maintain living conditions that promote the health and accommodate the natural behavior of the animal. These living conditions must include access to the outdoors, shade, and shelter, and fresh air, direct sunlight for particular species and access pastures for ruminants. Following living condition considered as:

- Round the year access for all animals to the outdoors, shade, shelter, exercise areas, fresh air, clean water for drinking, and direct sunlight suitable to the species.
- During the grazing season suitable pasture for livestock.
- Appropriate clean, dry bedding free from dust and dirt.
- Appropriate shelter designed should allow for livestock.
- Natural maintenance, comfort behaviors, and opportunity to exercise.
- Temperature levels, ventilation, and air circulation suitable to the species and reduction of potential for livestock injury.
- Sufficient feeding space without crowding and without competition for food during the non-grazing season and for supplemental feeding during the grazing season.

7.4. Waste management

Organic livestock producers are mandated to manage manure so that it does not contribute to the contamination of crops, soil or water and optimizes the recycling of nutrients.

7.5 Health care regulation

Organic livestock production requires producers to establish preventive health care practices. These practices include:

- Selecting the appropriate type and species of livestock.
- Creating an appropriate environment that minimizes stress, disease condition and parasites infection.
- Proper vaccination schedule and veterinary biologics.
- Standard animal husbandry practices to promote animal well-being.

Producers cannot provide preventive antibiotics. Producers are encouraged to treat animals with appropriate protocols, including antibiotics and other conventional medicines when needed, but these treated animals cannot be sold or labeled as organic. Producers cannot administer hormones or other drugs for growth promotion.

7.6 Record keeping

Organic livestock operations need to maintain records for a number of reasons such as:

- For the financial management of any organic livestock enterprise
- To verify the organic status of the animals and the production, harvesting and handling practices associated with them and their products.
- These records must demonstrate compliance with the Organic Food Production Act in India and equivalent legislation elsewhere.

So keeping a record is essential because organic production generally requires more record keeping than conventional production [41].

8. Breeds and Breeding

There is a wide range of organic farming enterprises. There are farms that focus on scale economies and maximum production efficiency per animal or per hectare. Other farms

focus on product quality, self-sufficiency, direct marketing/niche market, etc. These different types of farms may require livestock breeds with different characteristics. At present, organic farmers worldwide keep livestock according to circumstances where breed selection has been based on information from conventional production systems. Such livestock may not be optimally adapted to an organic, low-input farming system. 'Genotype x environment' interactions are important, especially when animals are reared under specific environmental conditions (such as organic production or conservation use). When animals are genetically adapted to specific/extreme conditions, they will be more productive and production costs will be lower [36]. Furthermore, selecting breeds suitable to the local environment will also safeguard animal health and welfare. Production in intensive systems is associated with high-energy concentrate feeding and regular, prophylactic veterinary treatments and the use of exotic livestock breeds. Livestock breeds have been developed for use under these circumstances. Organic forage-based livestock systems may require different breeds. Highly productive dairy cows, for example, may suffer physiological problems under organic conditions, as they need concentrates. The three main breeding strategies used to improve the breeds as suggested by [35], are selection between breeds, crossbreeding and selection within breed. All three strategies are important and can function given an appropriately designed breeding programme. Genetic improvement within a breed is the most difficult and slowest strategy but it is likely to have the best long-term potential.

9. Production requirements in organic farming

While conventional farming needs abundant, man-made resources, organic farming makes use of functional integrity of the system [4]. Organic farming depends on the local environment (soil, water) and less powerful tools (heavy equipment).

Although the exact production methods vary, general principles include the exclusion of most synthetic biocides and fertilizers, the management of soils through addition of organic materials and use of crop rotation [18]. The requirements (which apply to the way the product is created, not to the measurable properties of the product itself) by the USDA National Organic Program (NOP) are summarized as follows [29].

9.1 Crop requirements

- Land will have no prohibited substances applied to it for at least 3years before the harvest of an organic crop.
- The use of genetic engineering (included in excluded methods), ionizing radiation and sewage sludge is prohibited.
- Soil fertility and crop nutrients will be managed through tillage and cultivation practices, crop rotations, and cover crops, supplemented with animal and crop waste materials and allowed synthetic materials.
- Preference will be given to the use of organic seeds and other planting stock, but a farmer may use non-organic seeds and planting stock under specified conditions.
- Crop pests, weeds, and diseases will be controlled primarily through management practices including physical, mechanical, and biological controls.
- When these practices are not sufficient, a biological, botanical, or synthetic substance approved for use on the National List may be used.

9.2 Livestock requirements

- Animals for slaughter must be raised under organic management from the last third of gestation, or no later than the second day of life for poultry.
- Producers are required to feed livestock agricultural feed products that are 100 percent organic, but may also provide allowed vitamin and mineral supplements.
- Producers may convert an entire, distinct dairy herd to organic production by providing 80 percent organically produced feed for 9 months, followed by 3 months of 100 percent organically produced feed.
- Organically raised animals may not be given hormones, promote growth, or antibiotics for any reason.
- Preventive management practices, including the use of vaccines, will be used to keep animals healthy.
- Producers are prohibited from withholding treatment from a sick or injured animal; however, animals treated with a prohibited medication may not be sold as organic.
- All organically raised animals must have access to the outdoors, including access to pasture for ruminants. They may be temporarily confined only for reasons of health, safety, the animal's stage of production or to protect soil or water quality.

9.3 Other production-related inputs

The absence of synthetic fertilizers and pesticides in organic farming necessitates other inputs from manure addition to crop selection or irrigation. Farmers' knowledge of local conditions and of traditional practices is essential to the success of organic farming. The emphasis of crop varieties and animal breeds used in organic agriculture is on local suitability with respect to disease resistance and adaptability to local climate.

10. Regulations in organic farming

Factors that are used to classify organic farming may partly vary with local circumstances in terms of needs and availability of resources. In countries where organic farming is not widely adopted, and where no organic seedlings are available, seedlings originating in conventionally managed enterprises maybe used on an interim basis [21]. Similarly, in such situations, manure may not always be available from organic farms, and sourcing it from conventional farms may sometimes be allowed. The certification of the production process at the farm level, as opposed to product certification, is specifically chosen to ensure that organic products are indeed grown according to organic standards. The task is complicated because it includes ascertainment that the farmer has incorporated a number of practices to cope with soil fertility and pests, as appropriate, in the particular area where the farm is located[10,29].

Many organizations or countries have their own certification standards, which need to be at the same level or stricter than the IFOAM's guidelines. In total, more than 100 national or regional standards have been developed, some of them in developing countries, particularly in Latin America.

Certification can be carried out by an organization outside the country, especially if no national standards for organic agriculture are available, and no local certifying organization exists. Developing countries in particular make use of this possibility, as setting up the infrastructure needed for certification of organic products (standards, inspection scheme, ratification, appeal procedures, etc.) can be costly, and is seldom self-financing, especially in the early stages. In the early days of organic certification, traders found it

sometimes difficult to know which schemes genuinely certified organic produce. IFOAM has developed an accreditation program, which evaluates certification schemes and hence assists both the traders and the evaluated scheme [10].

The products from a certified farm can then be sold as "100% organic" where all ingredients must be organically produced, "organic" where 95% of the ingredients must be organic, "more than 70% organic" and "less than 70% organic"[26].

11. Organic Certification

It is a certification process for producers of organic food and other organic agriculture products. In general, any business directly involved in food production can be certified, including seed suppliers, dairy farm, farmers, food processors and retailers. Certification is essentially aimed at regulating and facilitating the sale of organic products to consumers and also prevents fraud [44].

The five main certifying bodies which monitor the standards for organic production and having worldwide acceptance are:-

- EU regulation (1804/1999),
- Organic Food Products Acts (OFPA) of USA,
- Draft Guidelines of Codex / WHO/ FAO,
- UK Register of Organic Food Standards (UKROFS)
- International Federation of Organic Agricultural
- Movements (IFOAM) basic standards

11.1 Certification bodies in India

In India, Agricultural Processed Foods Export Development Authority (APEDA) under the Ministry of Commerce is controlling body for organic certification. Currently, 12accredited agencies have (Table 1) been authorized to undertake certification process in India under National Programme for Organic Production (NPOP).

Table 1: Authorized certification agencies for organic products in India

Name of certifying agencies	Address
Association for promotion of Organic Farming (APOF)	Bengaluru, Karnataka
Indian Society for Certification of Organic Products (ISCOP)	Coimbatore,Tamil Nadu
Indian Organic Certification Agency (INDOCERT)	Cochin, Kerala
Skal Inspection and Certification Agency	Bengaluru, Karnataka
IMO Control Pvt. Ltd.	Bengaluru, Karnataka
Ecocert International	Aurangabad, Maharashtra
Bioinspectra	Cochin, Kerala
SGS India Pvt. Ltd.	Gurgaon, Delhi
LACON	Thiruvalla, Kerala
International Resources for Fair Trade (IRFT)	Mumbai, Maharashtra
One Cert Asia	Jaipur, Rajasthan
National Organic Certification Association (NOCA)	Pune, Maharashtra

11.2 Process of certification

In order to certify a farm, the farmer is typically required to engage in a number of new activities, in addition to normal farming operations:

Study - The organic standards, which cover in specific detail what is and is not allowed for every aspect of farming, including storage, transport and sale.

Compliance - Farm facilities and production methods must comply with the standards, which may involve modifying facilities, sourcing and changing suppliers, etc.

Documentation - Extensive paperwork is required, detailing farm history and current set-up, and usually including test results of soil, water, feed, medicines, etc.

Planning - A written annual production plan must be submitted, detailing everything from procurement to sale: source of animals, fodder, feed, medicines and farm activities, etc.

Inspection - Annual on-farm inspections are required, with a physical tour, examination of records, and an oral interview.

Fee – A fee is to be paid by the farmer to the certification body for annual surveillance and for facilitating a mark which is acceptable in the market as symbol of quality.

Record keeping - Written, day-to-day farming and marketing records, covering all activities, must be available for inspection at any time. In addition, short-notice or surprise inspections can be made, and specific tests (e.g. soil, water, animal products) may be requested [44].

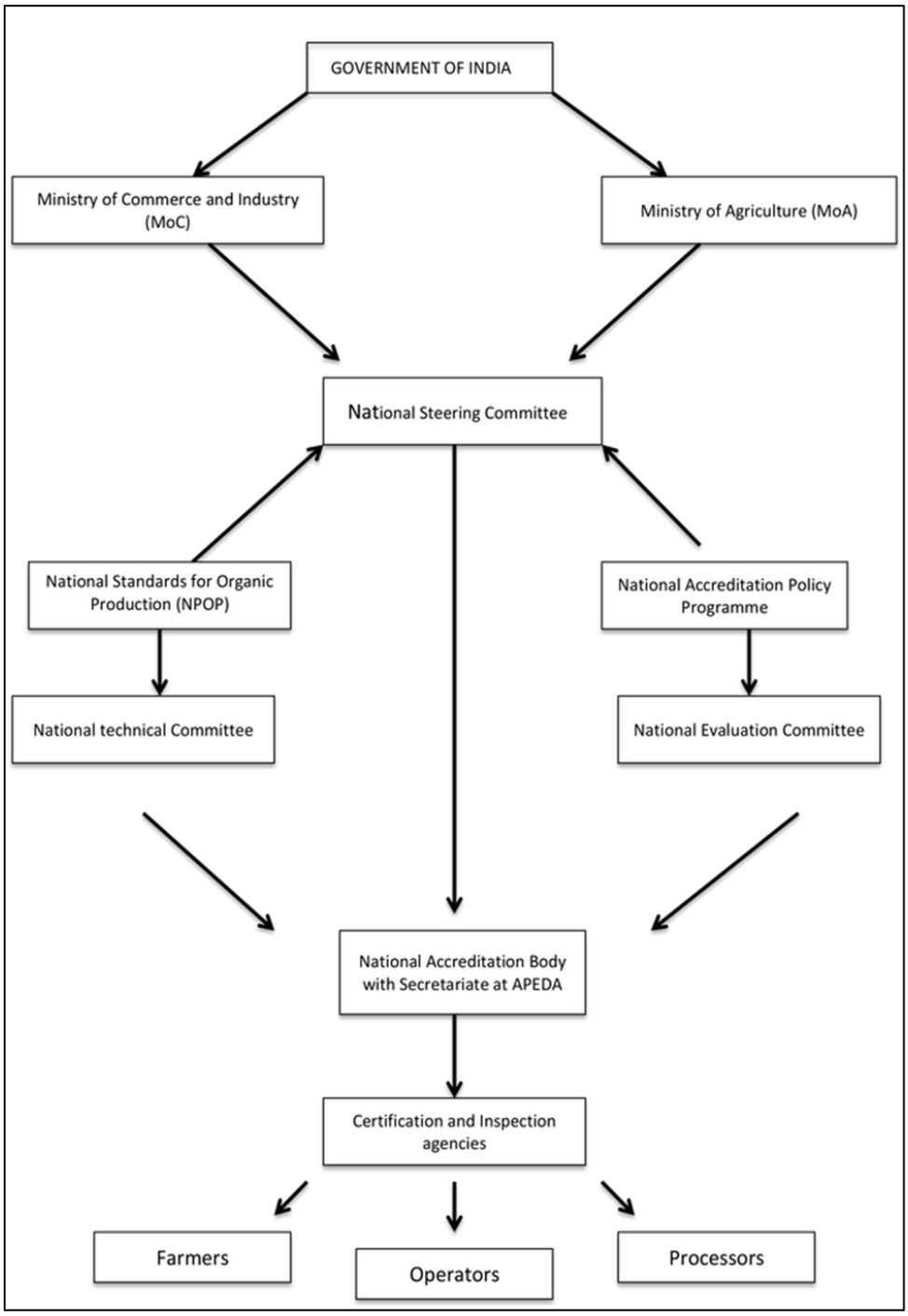

Fig 1: Operational Structure of National Programme for Organic Production (NPOP)

11.3 Conversion period

The time between the start of organic management and certification of crops or animal husbandry is known as the conversion period. The whole farm, including livestock, should be converted according to the standards over a period of three years. A farm already growing without chemicals may be certified organic without this delay [44].

11.4 Duration of conversion period

Plant products produced can be certified organic when the national standards requirements have been met during a conversion period of at least two years before sowing or three years in case of perennial crops. Animal products may be sold as "product of organic agriculture" only after the farm or relevant part of it has been under conversion for at least one year and in the case of dairy and egg production, this period shall not be less than 30 days. Animals present on the farm at the time of conversion may be sold for organic meat if the organic standards have been followed for one year.

To earn certification, organic farms must: **(a)** have long term soil management plans,**(b)** establish buffers between their fields and nearby conventional farms, **(c)** meet specific requirements for labeling and record keeping **(d)** use only allowed substances (see *Production Requirements*), **(e)**keep detailed records of all the materials used in their farming operations [29]. The products from a certified farm can then be sold as "100% organic" where all ingredients must be organically produced, "organic" where 95% of the ingredients must be organic, "more than 70% organic" and "less than 70% organic"[26].Today, 395 organizations worldwide offer organic certification services. Most certification bodies are in Europe (160) followed by Asia (93) and North America (80). The countries with the most certification bodies are the US, Japan, China and Germany. Many of the certification organizations also operate outside of their home country. 40% of the certification bodies are approved by the EU, 32% have

ISO 65 accreditation, and 28% are accredited under the US National Organic Program [42].

12. Challenges to organic farming

Despite serious efforts of some NGOs, it appears that India is lagging far behind in the adoption of organic farming. For laying the spadework for the spread of organic agriculture in the country, certain issues require attention at the government policymaking levels. These include:

- Substantial financial support of the governments which is absolutely necessary to promote organic farming
- Market development for the organic products which is a crucial factor to promote domestic sales
- Government support to the producer and consumer associations to market the organic products
- Simplification of the process of certification
- Reduction in certification cost

A rigorous campaign to highlight the benefits of organic farming against the conventional system is essential to increase awareness of both farmers and consumers (Narayanan, 2005).

13. Steps taken by government of India to promote organic livestock Farming

- Launching of National Programme of Organic Production (NPOP) in 2000.
- Indian National Standard for Organic Production (NSOP) developed and published in 2001 and revised in 2002.
- National Centre for Organic Farming established in 2003.
- Allotment of ` 100 crores in 10th plan outlay for organic development.
- A network project on organic farming sanctioned by I.C.A.R. (2004-07) involving four ICAR institutes and nine SAUs.
- A pilot study on organic milk production system undergoing at National Dairy Research Institute, Karnal.
- Declaring the states of Uttarakhand, Mizoram and Sikkim as organic states.

14. Impacts of organic farming

In many parts of the world, agriculture has caused environmental pressure, such as land degradation, water use and greenhouse gas emissions. Some specific impacts of agriculture on the global environment are documented below (Kendal and Pimentel, 1994).

- During the past 40 years almost one third of the world's cropland has been abandoned because erosion and degradation.
- Agriculture accounts for 80% of deforestation and 40% of the world's population lives in regions where water resources are over drafted and stressed, and where users compete for water.
- Methane (CH4) and nitrous oxide (N2O) emissions from agriculture in the EU amounted to 383mi. tons of carbon dioxide (CO2) equivalent in the year 2000, which correspond to approximately 10% of the total EU greenhouse gas emissions [15].

The increase of environmental pressure from agriculture is unlikely to reverse in the near future, since the world population continues to increase faster than global food supply, and diets continue to shift towards animal products [14].

A transition to organic farming could be a viable way of reducing energy use and greenhouse gas emissions. Synthetic chemicals and fertilizers are significant sources of energy use, and the transition to organic agriculture, being less reliant on these inputs, would alleviate these impacts [39].According to [10], organic farming would have long lasting, mostly beneficial effects on such important areas as:

14.1 Long-term productivity of the land: Protecting soils and enhancing their fertility would ensure productive capacity for future generations. Farmers often quote deteriorating soil quality as a major reason for adopting organic management. It can, therefore, be assumed that those farmers who adopted organic management practices found ways to improve the quality of their soil within the new management system, or at least stemmed the deterioration. Security of land tenure is important to the success of this task. If security is not guaranteed, there is little incentive for farmers to invest in a method that might only bring them income in the future rather than immediate rewards.

14.2 Food security and stability: In organic agriculture, a diversity of crops is often grown and many kinds of livestock kept. This diversification minimizes the risk of variation in production, as different crops react differently to climatic and edaphic variations, or have different times of growth (both in the time of the year and in length of the growth period). Consumers' demand for organic food and premium prices provide new export opportunities for farmers of the developing world, thus increasing their self-reliance. Organic agriculture can contribute to local food security in several ways. Organic farmers do not incur high initial expenses so less money is borrowed. Synthetic inputs, Unaffordable to an increasing number of resource-poor farmers due to decreased subsidies and the need for foreign currency, are not used. Organic soil improvement may be the only economically sound system for resource poor, small-scale farmers.

14.3 Environmental impact: In a study with pesticides and fruit thinners used in apple production [31], showed that the total environmental impact rating of the conventional system was 6.2 times that of the organic one. Organic farmers forego the use of synthetic fertilizers. Most certification programs also restrict the use of mineral fertilizers, which can only be used to the extent necessary to supplement organic matter produced on the farm. There are environmental advantages to this: non-renewable fossil energy needs and N leaching is often reduced [9]. Instead, farmers enhance soil fertility through use of manure (although the kind and its handling have significant effects on N content, and poor usage can create leaching problems), crop residues (e.g. corn Stover, rice straw), legumes and green manures, and other natural fertilizers (e.g., rock phosphate, seaweed, guano, wood ash). Within the agricultural sector, dairy production systems represent the largest source of CH4 and N2O emissions and may therefore have a large potential for greenhouse gas mitigation [40].

Although the benefits (both real and perceived) of organic farming and organic food are many, potential negative effects should also be noted, including the risk of contamination for human consumption [33]. For example, nitrate leaching may contaminate ground water used for drinking, or organic livestock might be contaminated with disease-causing microorganisms from manure and by animal parasites [32].

14.4 Social impact: The social impact of organic farming is considerable as mentioned in the IFOAM's Principal Aims.

The main benefit according by some organic farmers in developing countries (e.g., China and India) is that they now have better standards of living. Good product prices, low unemployment, dropped rural emigration, and reduced health risks (from chemicals) are the results of farming organic [26].

15. Constraints in the development of organic livestock farming in India

While many tropical countries are making concerted efforts to boost organic production, especially of high value commercial crops, with considerable success, some serious problems are still restricting growth in organic farming. Some of these potential obstacles, especially when exporting livestock products, are as follows [6].

- Small-sized land holdings
- Low level of literacy
- Lack of information about organic production practices
- High stocking density
- Inadequate production of feeds and fodders
- High cost of certification
- It is difficult to provide a large locomotion area
- Cost of production of organic meat is very high (in case of pork, 85.2% high)
- Organic milk and meat production may further decrease the availability of milk and meat
- Blank rejection of preservatives may have serious effects on food supply and safety of foods
- Processing or preservation of meat and meat products is difficult without use of certain chemicals like tri-sodium phosphate, sodium nitrate etc.

16. Conclusion

Increased consumer awareness of food safety issues and environmental concerns has contributed to the growth in organic farming over the last few years, although it only represented around 3 per cent of the total agricultural area. Now-a-days quality and health conscious consumers are increasing and they need environmentally safe, chemical residue-free healthy foods, along with product traceability and a high standard of animal welfare. These can be ensured by organic production methods. Organic farming can provide quality food without adversely affecting the soil health and the environment. Organic livestock farming should not necessarily be interpreted to mean that the foods produced are healthier, safer or all natural. It simply means that the products follow the defined standard of production and handling, although surveys indicate that consumers consider the organic label as an indication of purity and careful handling. In order to make organic livestock farming a success, there is need to take care of certain points, like reducing the paper work and cost for certification; sourcing of organic inputs like feeds and fodder, disease prevention, cost of production and maintaining animal health etc.

In summary, the organic food movement apparently had its roots in a philosophy of life, beginning perhaps with Rudolf Steiner, a notable German thinker, in the 1920s. One of its common believes is that natural products are good, whereas man-made chemicals are not, or at least not as well as natural ones. This partially explains why organic farming avoids the use of synthetic fertilizers and pesticides. Certainly, organic farming has many benefits ranging from reduced environmental pollution to increased soil quality. Let us hope that organic farming will lead all farmers, and their consumers, toward a more productive, prosperous, sustainable, and healthy future.

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