

Prospect of organic dairy farming in India: A review

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ABSTRACT

Dairy farming has the potential for providing additional income to the farmers along with achieving major goal of organic farming *i.e.* diversified production and supporting biological cycle within farming system. India presently is the largest producer of milk in world supported by an astonishing growth rate in dairy sector. Apart from this due to increasing consumer awareness there has been an increased concern voiced over quality of milk and milk products including contamination, pollutant and the residual effect of various chemicals. Interest in organic dairy farming is increasing at rapid pace worldwide as an alternative solution. Recent years have seen a sharp rise in demand of organic milk and milk products. Under Indian condition, rapid spread of organic dairy farming is possible because of some key geographical, cultural and economic advantages like traditional nature of farming and indigenous technical knowledge and practices followed by Indian farmers *etc.* But prevalence of small and marginal dairy farmers also poses many challenges for faster proliferation of organic dairy farming along with some other shortcomings. Present article provide some insight on strengths, weaknesses, opportunities and threats of organic dairy farming in the country along with some potential ways to overcome these weaknesses and threats.

Key words: Opportunities, Organic dairy farming, Organic standards, Strengths, Threats, Weaknesses.

The interest in organic crop and livestock farming reemerges in recent time due to growing concerns about the conventional farming paradigm that relies on synthetic inputs to maximize yields which poses threats to the environment and health. Intensive farming by introduction of exotic species, land clearing, vegetation fragmentation, habitat change and soil erosion has been one of the main causes of biodiversity decline. (Bengtsson *et al.*, 2005; Hole *et al.*, 2005). On the other hand organic production focuses on building soil organic matter and biology to create a sustainable and dynamic environment for producing healthy food and feed and proved to be beneficial for flora and fauna (Fuller *et al.*, 2005; Gabriel *et al.*, 2006; Gabriel *et al.*, 2010). The quality of natural resource base is declining especially in the areas practising intensive farming for decades and there are increasing evidences of presence of toxic residues in food chain as a result of this chemical intensive farming confirmed by various researches. On the other hand consumers are increasingly seeking environmentally safe, chemical residue free healthy foods, along with product traceability and a high standard of animal welfare, which organic production system can ensure (Chander *et al.*, 2011). Thus organic crop and livestock farming is gaining ground among Indian farmers. It is also considered as only feasible alternative and interesting option for sustainable agriculture in developing countries because it offers a unique combination of low

external inputs and technology, environmental conservation and input/output efficiency (Augustine *et al.*, 2013). But unlike organic crop farming the concept and practice of organic dairy farming is relatively new. Organic dairy surged into the organic marketplace in the 1990s, establishing itself as a major category. In India it became visible much later (Oruganti, 2011). Organic Dairy farming means rearing animals on organic feed (*i.e.* pastures cultivated without the use of fertilizers or pesticides), have access to pasture or outside, along with the restricted usage of antibiotics and hormones. It deliberately avoids the use of synthetic inputs such as drugs, feed additives and genetically engineered breeding inputs. Welfare of animals is also of prime importance under organic dairy farming system (Lund and Rocklinsberg, 2001; Chander *et al.*, 2013; Chander and Subbaramaheswari, 2013). Organic dairy farming is a system of production, a set of goal-based regulations that allow farmers to manage their own organic integrity. (Sundrum, 2001; Oruganti, 2011; Wolde and Tamir, 2016).

Prospects of organic dairy farming in India: Given the predominance of close to traditional and integrated farming system in rural India and rising consumer awareness and demand in domestic as well as foreign market for healthy food products organic farming could be a blessing for Indian farmers. Unlike the conventional crop farming sector the

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dairy production in developing countries and also in India is not highly intensive as is the case with other developed countries in dairying (Ortiz and Hue, 2007; Wolde and Tamir, 2016). Some of the agro-climatic regions in India are best suited for organic milk production. These areas include the rain-fed areas of Rajasthan, Gujarat, Madhya Pradesh, hilly areas of Himachal Pradesh, Uttaranchal, Jammu and Kashmir, Tamil Nadu and whole of North-Eastern region. There are some areas in the country (especially mountain areas) and communities (certain tribes) where the green revolution technologies have so far not reached and did not adopt the use of agro-chemicals. These areas have been classified as “organic zones”(Singh, 2007). The North Eastern region of India also have high potential for organic farming due to least utilization of chemical inputs where it is estimated that 18 million hectares of such land is available which can be exploited for systematic organic production (Ghosh, 2006). The Trans-Gangetic plains region of Punjab, Haryana, Western U.P. and parts of Rajasthan have witnessed the most intensification of crop husbandry by way of intensive crop rotations and the heavy use of inorganic fertilizers and agro-chemicals. However, even in this region and also in other region, dairy farming has not received much intensification as has been the case with advanced countries and, therefore, is amenable to conversion to organic with little effort. The organic dairy farming has a good scope in the country as it is the small holder’s low input, crop residue fodder based production system contributing 70% of total milk production of the country (Kumar *et al.*, 2005). Thus these systems are expected to offer a more profitable and sustainable production system based on low input (Hermansen, 2003). But the predominance of small holder and landless dairy farmer in this sector is also a source of potential challenge for organic dairy farming especially due to certification difficulties, traceability problem. Also these small farmers are producing a few litres of milk daily are not in a position to market it as organic milk due to ignorance and due to unavailability of local market for organic produce. However, the cooperative organization can play an important role for promoting organic dairy farming in these interior rural areas by certifying, procurement, processing and marketing of organic milk. On the other hand given the less demand of organic products in domestic market for getting premium price for their products farmers definitely need to depends on export market. But animal products are still a small share of the organic market, compared to fruits, cereals and herbs, and, in terms of exports, are almost negligible in developing countries (Willer and Kilcher, 2011). So, given the pros and cons there is a need to critically analyse the strengths, weaknesses, opportunities and threats related to organic dairy farming in India.

Strengths

Availability of quality indigenous breeds: Breed requirement under organic dairy farming system is highly location specific (NPOP, 2005). In a diverse country like India one breed of dairy animal neither that much successful nor recommended. But in India unlike foreign country a number of good quality local breeds are available for each specific region. Breed like Sahiwal, Gir, Red Sindhi, Rathi, Tharparker of cattle, Murrah, Surti, Nili Ravi, Jaffrabadi, Mehsana of buffalo are best local milk producing breed.

Natural and integrated farming system: Organic farming requires agro-ecosystem complexity and cropping diversity, a transition from monoculture to mosaic and an optimal spatial and temporal integration of components (Nardone *et al.*, 2004). Integrated crop livestock farming system predominant in India with well diversified livestock population is ideal for organic livestock farming. Most of the Indian farmers still practising a close to natural farming with limited external input use including for animal production and maximum on farm reliance bring its further close to organic farming. This integration of various forms of crops and animals ensure input availability for both crop and dairy enterprise along with efficient recycling of by-products. It also offers synergistic interactions with a greater total contribution than the sum of their individual effects (Butterworth *et al.*, 2003; Devendra, 2003).

Resistance to diseases: Indian dairy animal breeds are less susceptible to disease and stress need less allopathic medicine/antibiotics which make them ideal for raising under organic management. In case of health problem homeopathic or ayurvedic medicine could be used. The rich biodiversity of Indian continent along with rich indigenous knowledge base among farmers can ensure the efficient treatment and recovery of animals in case of health problem. Along with this increasing research effort also ensured that there is sufficient knowledge and technologies available concerning disease prevention and feeding management in organic dairy production system (Nardone *et al.*, 2004).

Animal welfare: Dairy farming in India largely extensive or semi extensive in nature where animals are not seen as business vehicle like factory type of animal production common in developed nation (Chander, 2014). Due to moral obligation and religious sanctions animal welfare is not too much compromised by common Indian farmers.

Indigenous technical knowledge: India is the bastion of a diverse traditional knowledge useful for every aspect of farming. Thus ayurvedic and other local herb based health care system are widely used by the farmers for animal health care. The use of allopathic medicine is very less which not only cut cost but also giving India an upper hand over developed countries.

Better performance of dairy animals: Generally the yields drop by about 10% when converting to organic production but it is possible to maintain a high yield level in organic cows. A research undertaken in National Dairy Research Institute, Karnal proved that total lactation yields (2703.93±237.42 vs. 2358.33±248.08 kg), total lactation lengths (347.66±39.722 vs. 323.5±41.84 days) and the 305 day milk yield (2439.7±156.25 vs. 2081±133.90 kg) were found to be higher in organically managed buffaloes as compared to conventionally managed buffaloes. Health status of the buffaloes in the organic group was found to be better than the health status in the control group of buffaloes (Kamboj *et al.*, 2013). Studies undertaken in various European countries reported a range of 80-105 per cent milk yield level of organic herd (Kristensen and Mogensen, 2000; Padel, 2000; Hermansen, 2003). Generally Organic management causes less metabolic stress for the more natural management but for the same reason, the milk yield is always smaller and the reproductive performance is often better. But a well-managed nutrient supply in the form of organic feed can ensure comparable milk production of organic cattle in long term (Jakobsen and Hermansen, 2001).

Weaknesses

Small and Marginal farmer: Like crop farming, dairy farming also dominated by small and marginal farmers in India. Around 70 per cent of milk produced in country came from small holders. Milk and other products sourced from large number of small farmers also making the traceability a difficult option. But given the increasing local demand of organic products and considering India's rich experience in co-operative movement especially in dairy sector promotion of co-operative dairy farming and contract farming can overcome this inherent problem of small and marginal farmer dominance. Other innovative value chain model like Ksheerasamruddhi model in Kerala, which is based on forming Self Help Group to produce, package and supply quality milk in consumer doorstep in surrounding areas (Sreeram and Gupta, 2016) could also be explored for organic milk production and marketing.

Incidence of disease: Although India achieved total eradication of many diseases like Rinderpest (Gangadharan, 2010) but prevalence of disease like Foot and Mouth disease, Mastitis in various regions of India is one limiting factor for quality maintenance as well as export of dairy products. Along with prevailing unhygienic and messy condition at production sites, processing units, India needs to do a lot so as to be eligible for organic milk producing country (Barbuddhe and Swain, 2008). In organic animal production systems, the animals are particularly at risk due to outdoor rearing and ban of prophylactic medication. So, in organic dairy system, parasite infection is the biggest challenge in

terms of animal health and consequently in terms of product quality for the consumer. (Hermansen, 2003; Kouba, 2003). So achieving control on these diseases is a priority factor to increase the acceptability of our products in western nations given their strict organic standards. Though these problems can't be completely eradicated at once but can be controlled slowly by rational grazing management (like moving stock to uninfected areas and/ or using diluting strategies by alternating or mixing species on same grassland), use of plant extracts, use of homeopathic treatment, use of special forage crops and improved pasture species which may improve animal resistance like *Lotus pedunculates*, which has a high content of condensed tannin, development of vaccines against parasites, animal nutrition (improving resilience and resistance), biological control of parasites (by applying native or exotic natural enemies against nematode parasites), genetic resistance to nematode infections *etc.* (Hermansen, 2003; Ronchi and Nardone, 2003).

Production drop and Cost concern: Studies conducted around the world give different accounts about productivity of cattle in organic dairy ranging from 10 to 18% lower milk yields to significantly higher milk yield under favourable situation as compared to conventional production system (Mendoza, 2002; IFAD, 2010; Kamboj *et al.*, 2013; UNCTAD, 2013). It is also argued that the health of the organic cows might be impaired because of a poorer plane of nutrition as affected by the restrictions on feeds used in organic dairy production (Hermansen, 2003). But many studies also nullified this concern, as no major differences on health aspects in general have been identified (Sundrum, 2001). Generally milk yield dropped during initial years of conversion from conventional to organic dairy farming. But in Indian condition given the lower productivity of indigenous animals and predominance of small dairy holders the meagre loss of production will not be withstand by the farmers and thus will be possibly demotivating for converting. Another point of concern is organic dairy farming involve a more intensive use of labour. The labour needed to manage an organic farm is at least ten to twenty percent higher than on comparable conventional farms (Wolde and Tamir, 2016). The costs of organic inputs are also often higher. Thus, though total costs for operating most organic farming systems are lower than those for comparable conventional farms this does not necessarily translate into higher net market income per unit of labour because organic farms need more units of labour to tend the same number of hectares or cows. But these cost and production concerns can be outsmarted given increasing willingness among consumers to pay premium price, by cutting cost with more evolved market chain and by introduction of subsidy for farmers during transition time for production lost.

Lack of organic farming knowhow and proper training:

In most developing countries decades of promotion of chemical based farming method has eroded indigenous technological knowledge base and currently most of the technical support is oriented towards using technologies that can enhance productivity per unit input and time. There is also lack of extensive promotion work concerning negative impact of products from inorganic farming (Setboonsarng, 2006). The low level of education prevailing among Indian farmers and lack of knowledge and awareness about critical issues of organic farming is a big challenge for promotion of organic dairy farming. There also lack proper training especially for organic dairy farming procedures and standards (Kamboj and Prasad, 2013). But with the increasing penetration of ICT among Indian farmers this lacuna can be overcome which is often stem from lack of well qualified manpower among countries extension and training organizations.

Opportunities

Consumer awareness and demand for healthy food: There has been a trend over the last decade for products associated with lifestyle choices and process quality which ultimately justify premium price of organic products (Nardone *et al.*, 2004). The consumer's interest in organic farming seems mainly to be related to care of their own health and the environmental impact of agriculture, better test but also to considerations of animal welfare (IFST, 2001; Hermansen, 2003). With increasing per capita income, change in lifestyle and food habits demand for organic dairy products is growing in domestic market as well as in foreign market, especially in the USA, EU, Japan, Argentina and Brazil. Literacy is on the rise and the media are making consumers more aware of and concerned about animal welfare issues and healthy foods. This may well boost the domestic consumption of organic foods.

Grass or crop residue based feeding: Most of the livestock in India is kept by the small and marginal farmers that do not have enough resources. As a result the animals are fed mostly grasses and agricultural by-products mostly straw. In India, there is very limited practice of fodder production in rural areas and animals generally consume naturally grown grasses and shrubs which are of low quality in terms of protein and available energy, they are thus heavily dependent on seasonal variations and this results in fluctuation in fodder supply round the year affecting supply of milk round the year (Meena and Singh, 2014). It is estimated that crop residues contribute on an average 40–60% of the total dry matter intake per livestock unit in rural India (Singh *et al.*, 2014). But given the predominance of integrated and well diversified crop livestock integrated farming more cultivation of legumes will improve the quality of feed along with other

beneficial effects. Availability of home produced protein-rich concentrates such as beans, peas contributes to reduce the necessity of commercial concentrates. The use of self-reseeding annual legumes (*Trifolium* sp. and *Medicago* sp.) can be beneficial to low input and organic farming systems (Howieson *et al.*, 2000; Caporali and Campiglia, 2001). And the available grasslands can be improved by introducing highly nutritive grasses species and careful grazing management. This can be done by involving the well developed and empowered local Panchayat system in Indian context.

Protecting and enhancing biodiversity and positive social impact:

Organic farming is environmentally friendly also provide energy for microbial activity. Chemicals have destroyed many beneficial insect species and have caused environmental degradation (Bello, 2008). 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 (Chander *et al.*, 2011). This will be particularly beneficial for improving already degraded biodiversity in green revolution areas as well as will help to maintain and enhance natural resource base in other traditional farming dominated area. Organic dairy production also has significant social impact on rural communities. 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 (Wolde and Tamir, 2016).

Threats

Foreign market dependence: Domestic market for organic products is not still at developing stage and the international trade in organic dairy products is considered a risky businesses due to poor sanitary conditions, existence of diseases, traceability problems as also self-sufficiency in importing countries, which might discourage producers in India too. The restriction applied on import of agricultural products from developing countries often due to political reasons is an important limiting factor given the limited demand and less price premium in domestic market.

Polluted natural resources: Intensive use of fertilizers and pesticides throughout the last few decades leaves soil, water and other natural resources contaminated. Problem of pesticide residue is quite high in India despite of the fact that average consumption of pesticide in India is far lower than many other developed countries. Heavy use of pesticides has polluted fodder and animal feed concentrates resulting in contamination of milk and milk products, eggs, meat and meat products consumed by human beings (Prasad and Chhabra, 2001). The residue of pesticide in milk sample

collected from intensive chemical farming practising region of Punjab, Haryana, UP etc. showed a decline trend over the years but they did not ceased to exist in milk. Some of the less popular and fat soluble organophosphorus pesticides like acephate, diazinone, phorate, chlorpyrifos and malathion have been detected in foods with high fat content including dairy products (Ivey *et al.*, 1993). Quinalphos, parathion- methyl and ethion were detected in few samples from river Ganga and malathion and monocrotophos were also detected from ground water samples from some areas of UP (Mohpatra *et al.*, 1994, Bansal and Gupta, 2000). Along with pesticide heavy metals like mercury, lead, cadmium and arsenic are the common heavy metals detected in milk samples at some locations in India (Dwivedi *et al.*, 2001). But it was also confirmed by many studies that relative low presence of pesticide residue in organic as compared to conventional product (Maruejous and Goulard, 1999; Kamboj *et al.*, 2013), although organic milk may not be completely pesticide free, especially due to environmental contaminants if judicious use is not promoted (Woese *et al.*, 1997). Thus for organic farming use of these chemical inputs should be stopped not only by the organic farmer but also in surrounding fields also.

Organic dairy farming standard: Organic dairy farming must meet the strict regulations which need to be monitored by well-developed mechanism which is presently lacking in India. Given the totally different characteristics of Indian Dairy farmers the blind follow-up of organic dairy standard of western developed nation will be totally unacceptable and unfeasible for Indian farmers.

Fodder shortage: It is estimated that India have a demand of 1097 million-tonnes of green fodder and 609 million tonnes of dry fodder against the supply of 400.6 and 466 million tonnes respectively. Thus it represent a deficit of 63.50 per cent and 23.56 per cent of green and dry fodder against actual demand which will further grow to 64.21 per cent and 24.81 per cent up to 2020 (Planning Commission, 2001). Due to heavy population pressure and decreasing land availability it is unlikely that farmers will be able to delineate more land resources for fodder cultivation. On the other hand available grazing lands also keep on declining over the years. Thus the present situation of shortage of green fodder will possibly further aggregated in future (Mishra *et al.*, 2009)

Nutrition management challenge: Dairy production systems face unique nutrient management challenges. Most dairy farms run large nutrient (NPK) surpluses as a result of high nutrient imports (mostly as feed) relative to farm nutrient

Table 1: Maximum number of animals per hectare (Draft Indian standard)

Class	Maximum number per hectare
Dairy cows	2
Calves	5
Male bovine animals from one to less than two years old	4
Female bovine animals from one to less than two years old	4
Male bovine animals two years old or over	2
Goats	14
Sheeps	14

(Chander, 2014)

exports (mostly as milk). Studies in western nations suggested that some organic dairy farms may develop phosphorus deficiencies especially decreasing top soil phosphorus concentrations (Anderson and Magdoff, 2000; Loes and Ogaard, 2001). Thus Milk fever or hypocalcaemia is sometime more in organic farming than conventional farming (Patra, 2007). Giving the low application of phosphorous by Indian farmers and already deficient nature of Indian soil this issue can become a potential threat of fertility of soil in organic dairy farms.

CONCLUSION

Dairy farming systems are now expected to meet a number of objectives *viz.* to produce milk, to minimize environmental damage and to improve animal welfare, biodiversity and environmental goods. Given rich indigenous knowledge of livestock farming, rich biodiversity, availability of cheap labour, lower cost of production of organic dairy farming and with still unexplored vast domestic market conversion to organic production looks like a lucrative option for Indian dairy farmers. But given its stringent standard requirement it's hard to be adopted on a mass scale in short time. Indian farmers need to use the strengths and opportunities they have to overcome the weaknesses and potential threats. If supported by successive capacity and knowledge building and the establishment of certifying organizations and promotion of organic dairy products to increase consumers awareness of organic products, its nature of being environmental friendly and capacity to maintain quality of natural resources, it will help farmers to engage in organic production and will contribute to the wellbeing of the environment, the livestock species, the human being in general. It requires strong policy initiatives by government for organic farming by coming out from past dilemma and heart and soul implementation of those policies by all stakeholders.

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