Indian J Anim Health (2025), 64(1) - Special Issue: 27-36
DOI: https://doi.org/10.36062/ijah.2025.06524

Review Article

Blockchain technology for Indian dairy industry: A sustainable food safety model

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Abstract

India is the leading milk producer nation yet faces adulteration in different stages of the supply chain. Consumers' consciousness towards quality food products has increased in recent years. However, adulteration in the dairy industry is being continuously reported. Faulty animal husbandry and processing practices are the major reasons for the compromised quality of milk and milk products. Such unhealthy practices may diminish consumers' faith in processed dairy products. This may be dealt with strict food safety regulations, standard production and processing techniques. Animal-derived products that are transparent and traceable, with end-to-end detailed information, bring trust to consumers. Blockchain technology (BCT) is a revolutionary technique that may help combat these aspects in the dairy supply chain. The main aim of this review is to lay out the concepts, techniques, and future prospects of BCT as a sustainable food safety model from an Indian perspective. In addition to this, the background of the Indian dairy industry has also been briefly discussed for better insights into the compatibility of BCT in India. There is a lack of technological infrastructure, finance, human competency, knowledge and understanding of smart technology and resistance from small-scale dairy farmers. For the introduction of BCT in the dairy industry, all the stakeholders must have the basic know-how and grasp of the Blockchain process. BCT, IoT, AI, and management decisions based on raw data are expected to significantly improve the use of technology in dairying for improved food safety in Indian contexts.

Keywords: Blockchain technology, Consumers, Food safety, Indian dairy industry

Highlights

- Blockchain technology may help in achieving food safety under Indian conditions.
- It may help in bringing trust to consumers regarding dairy products.
- It may help in improving animal health.
- It may help in reducing wastage.

INTRODUCTION

Food quality is the utmost requirement for a satisfactory healthful existence. However, the modern food industry is plagued by significant adulteration and contamination, which undermines a healthy lifestyle. The complexity of the food supply chain increases the risk of microbial contamination and proliferation. The trust of humans in manufactured foods is increasing, but their quality has been degrading over the years (Miranda and Ramachandra, 2014; Pant *et al.*, 2015). As food manufacturing has grown, many people have reportedly contracted illnesses from eating tainted food items. Indian dairy industry is the global leader in milk production, with 221 MT in the year 2021-2022 (NDDB, 2024), with its high demand in the majority of households on a regular basis. India is the greatest producer and consumer of dairy products. Whether in liquid form, as processed products like curd, ghee, and sweets, or in infant milk formulas, milk is one of the most widely consumed products in India. Milk's nutritious value makes it essential for a healthy and balanced diet. Currently, approximately 800 to 1000 milk products of various varieties are prepared worldwide. Dairy products like cheese, butter, ice cream, yoghurt, and dry milk powder are widely consumed globally. India accounting 50-55% of total milk production for traditional dairy products (Pal *et al.*, 2018). Microbial contamination of milk and milk

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products can come from several sources, including environment, handlers, equipment, and packing materials. Nowadays, consumers in India have started buying more of certified and quality food products (Nandi *et al.*, 2017). In developing countries like India, dairy products are seen as vital traditional food staples (Nagpal *et al.*, 2012). They provide important nutrients, including protein, calcium, vitamin D, potassium, and others, which are essential for bone health, muscle function, and cardiovascular well-being. Adulteration has been seen in milk products, and it has increased manyfold in recent decades. The major reason for adulteration is economic profit, for increasing milk yield and volume which adversely affects the health of consumers (Jha *et al.*, 2016). Extensive amounts of milk in the Indian dairy business have been contaminated in recent decades, indicating a sizable populace has been ingesting impure milk. Adulteration and contamination mainly occur due to the poor linkage and non-transparency between different stakeholders involved starting from the farm to the end consumers (Versino *et al.*, 2023). The use of antibiotics or other damaging treatments combined with faulty animal feeding practices, as well as corrupt and unhygienic handling of milk, has led to its impurity at different stages of the supply chain (Gorton *et al.*, 2006; Sachi *et al.*, 2019; Singh, 2022). In addition, non-hygienic milking practices and unsanitary surroundings around animals can cause microbial contamination (Singh *et al.*, 2020; Singhal *et al.*, 2020). Adulteration through increasing the amount of milk by adding water, vanaspati, oil, detergent, etc., is also practiced to profit a few rupees. Adulteration not only reduces the nutritional value of milk but also poses a harmful threat to human health, especially in children and infants (Poonia *et al.*, 2017). Therefore, monitoring and traceability are essential in each stage of the stakeholders in the supply chain to minimize milk contamination (Khanna *et al.*, 2022).

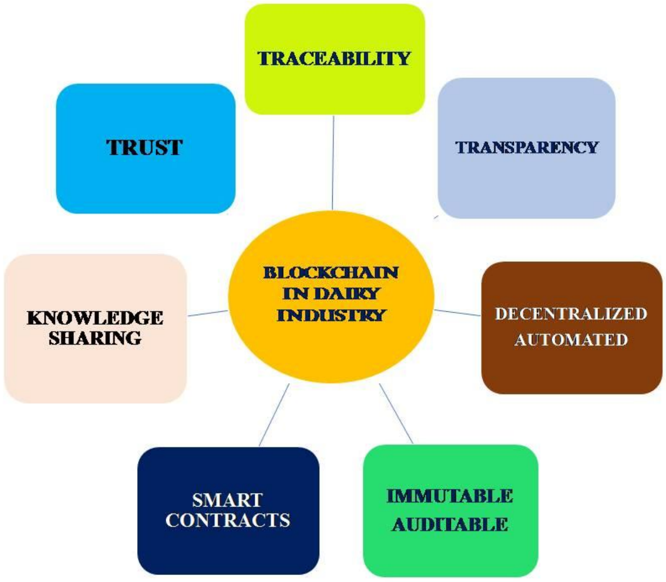

Fig. 1. Facets of Blockchain technology in dairy industry

Blockchain is an emerging technology that combats food safety issues such as contamination, adulteration, etc. BCT is a kind of distributive ledger technology that was first reported in 2008 for cryptocurrency (Bhardwaj and Kaushik, 2018; Choi, 2021). Blockchain in the dairy sector is a growing technology which enables a safety and traceability system as well as reduces operational costs, and helps in automated dairy supply chain management (Li *et al.*, 2018; Cole *et al.*, 2019; Kamble *et al.*, 2020). Although BCT is the fastest-growing and most well-acknowledged technology worldwide, India is still a strong market for it. Supply chain platform focuses on preserving dairy products' nutritional content rather than merely food traceability. There are various factors which are responsible for the success of Blockchain technology (Fig. 1) (Kamilaris *et al.*, 2019) for supply chain management such as traceability, transparency, trust, knowledge sharing, smart contracts, tokens, immutability, auditable, quality assurance, decentralized, automation and removing intermediaries (Khanna *et al.*, 2022; Verde *et al.*, 2023). Though India is in its developing stage for utilizing Blockchain technology (Kamilaris *et al.*, 2019), the government of India has shown a keen interest in Blockchain technology in various fields, as evidenced by the report of NITI Ayog (National Institution for Transforming India) (NITI Ayog, 2020).

BCT allows consumers to receive information regarding the nature, quality and origin of products. In some recent studies, researchers have highlighted that BCT, along with the Internet of Things (IoT), may revolutionize the monitoring of critical parameters of milk and milk products during the entire supply chain (Zelbst *et al.*, 2020; Kayikci *et al.*, 2022; Kumar *et al.*, 2023). This may lead to enhancement of payments, food safety, reduced food wastage (Lemma *et al.*, 2018; Jagtap and Rahimifard, 2019) and transportation time (Kamilaris *et al.*, 2019). There was an urgent need for an informative review on Blockchain technology under Indian situations. Therefore, the aim of this review is to discuss the Indian dairy scenario, Blockchain technology, challenges and its future prospects under Indian conditions.

Features of BCT

Distributive ledger technology (DLT) and BCT enable secure and transparent transactions without a centralized third party like a financial institution or government. Transaction information is stored in encrypted blocks with a unique ID (hash). These blocks are sent to network members who verify the transaction by checking all hashes in all blocks (Mangla *et al.*, 2021). Once verified, the block is linked to the previous block using the hash in a continuous chain back to the original transaction. Changes to the block information must be done with the hash, as changing the hash would result in the block no longer being correctly linked in the chain (Kamilaris *et al.*, 2019).

A stakeholder may more easily follow the movement of a specific dairy product along the whole supply chain, thanks to Blockchain technology. Any stakeholder can track the existence of a specific dairy product, batch, or entire order (De Las Morenas *et al.*, 2014; Galvez *et al.*, 2018; Bumblauskas *et al.*, 2020; Fan *et al.*, 2022). Smart-engineered devices used in animal husbandry (Singh *et al.*, 2021a) may be helpful in tracing the details of animals' husbandry and well-being practices. Other model companies such as Cargill, Gogochicken, JD, and IBM have already started using Blockchain technology to trace their products (Kamilaris *et al.*, 2019). Every player in the supply chain is informed of any transaction taking place. All can have equal access to information on dairy products, orders and its further movement.

Blockchain fosters trust among supply chain stakeholders, preventing trust deficits between end consumers and dairy companies, thereby enhancing the overall supply chain efficiency. Increased transparency and traceability build trust in consumers as they can learn about the origin, process, storage, and market of their products. Blockchain can make it easier to share useful insights regarding dairy product distribution and sales among several distributors and retailers, ensuring a safe and efficient knowledge exchange system.

It enables seamless interactions between stakeholders, such as purchasing, managing multimodal shipping, and deleting products, resulting in efficient and secure transactions. Cryptocurrency tokens offer a more flexible, secure, and fast method for financial settlements, surpassing traditional methods like cash and credit.

The data stored on the Blockchain cannot be edited or revoked once it is completed between two points. Blockchain-enabled dairy supply chains offer audit ability due to the secure recording and storage of transactions on individual blocks using cryptographic hash functions, unlike traditional chains. Data is fully encrypted hence, immutable. Blockchain helps maintain dairy product quality throughout the supply chain, enforces regulatory standards, tracks product parameters, and generates quality certificates.

Blockchain-enabled supply chains are decentralized, preventing single-point failure and data manipulation. They support high levels of automation, including product updates, payment settlements, product removal, stakeholder addition, and more. Blockchain-enabled supply chains eliminate intermediaries, ensure dairy product safety, and prohibit transactions or entry by unauthorized stakeholders.

Indian dairy scenario

India is one of the leading producers of milk and milk products across the globe, and the dairy industry is one of the major industries in India. The elevation in milk production was started during the white revolution in India in the form of three phases of operation flood from 1970 to 1996 (Banerjee, 2022; NDDB, 2024). From then, scientific dairy farming in India was prioritized on cooperative and commercial scales. Different milk-derived products, such as butter, cream, ice cream, cheese, etc., received their first tractions. However, more than 75% of the Indian dairy-producing system is informal (Kumar *et al.*, 2022), and no strict auditing system is implemented for contaminated and adulterated milk and milk products. Most of the dairy operations are performed manually, which may result in a lack of hygiene due to human errors. From the perspective of a consumer, one must acquire quality products in return for the hard-earned money invested. Keeping this view of food safety concerns in India, FSSAI (Food Safety and Security Authority of India) was laid down in 2006. Not only the adulteration is responsible for the degradation in the quality of milk and milk products but also the faulty animal husbandry practices play major role in deterioration of the quality of milk and its products. Proper management, nutrition, breeding, health, and well-being of animals should be met to produce healthy milk so that its product meets various quality standards (Erickson and Kalscheur, 2020; Singh, 2021). Proper management during growth, transition, and lactation phases should be given priority by the herdsman (Singh *et al.*, 2021b). Besides, the farmers may be provided with training regarding clean milk products along with proper animal management practices (Singh, 2022).

The dairy production and processing phase must aim for the most judicious utilization of resources without posing a risk to the environment (Gowane *et al*., 2017). They should aim for the least emission of harmful greenhouse gases (Singaravadivelan *et al*., 2023). Recently, the United Nations has also laid down 17 sustainable goals for the betterment of humans and the environment (WHO, 2016). Dairy production and processing may aim to be in line with such sustainable development suggestions, particularly good health and well-being. In a recent review by Singh *et al*. (2021a), it was proposed that with the usage of advanced engineered devices in dairy farming coupled with expert suggestions, the production of quality milk may be simplified.

Utilization of BCT in Indian dairy system

Collection, feeding, processing, transactions and retrieval of these data continuously are the first minimum criteria for BCT (Galvez *et al*., 2018; Zhao *et al*., 2019). Without data management, the BCT may fail completely. Therefore, the workforce associated with different phases of production, processing and marketing should have knowledge and skills regarding data maintenance and usage. There will always be a need for expert statisticians who will collate these data into a meaningful result (Singh *et al*., 2021a). Under the aegis of the Government of India, the National Information Centre (NIC) has laid down the centre of excellence in BCT in Bangalore, Karnataka. Goa, Kerala, Karnataka, Gujarat, and West Bengal are among the top BCT-utilizing states in India. Gujarat Narmada Valley Fertilizers and Chemicals Subsidy Pilot Project, Kerala Development and Innovation Strategic Council, Emertech Innovations, and TraceX are some examples of organizations in India that have adopted BCT in their operations (Kumar, 2024). Three major steps involved in BCT in the dairy industry include the production and collection phase, the processing phase at the cooperative and industrial level and the application phase.

Production and collection phase: Data pertaining to breeding, feeding, heeding, health care and general management of animals have to be maintained at the farm level for each animal whose product (milk, meat or eggs) and by-products (skin, dung, etc.) are moved towards further processing. Expert herdsman will have to apply all management skills efficiently to bring the best outcomes along with the maintenance of animal health and welfare and minimizing the waste from their respective farms. They have to aid in the collection of products and by-products. Data on each and every animal, including its feed, medications, and milking, has to be maintained and shared for retrieval in the Blockchain process. Interestingly, if the number of collection partners increases, more data will be produced that needs to be recorded effectively. Moreover, an increased number of collection partners will expand market feasibility and reduction in wastage (Pournader *et al*., 2020; Mangla *et al*., 2021). Recently, indigenous cattle attained much interest due to the production of milk with more fat and sweetness in addition to their A2 characteristics (Sodhi *et al*., 2012). Through BCT, consumers may trace if the produce was from an indigenous breed, for which they may pay a better price. This may also enhance the income of dairy farmers who possess indigenous breeds. Fig. 2 shows the proposed working model of BCT for the Indian dairy industry.

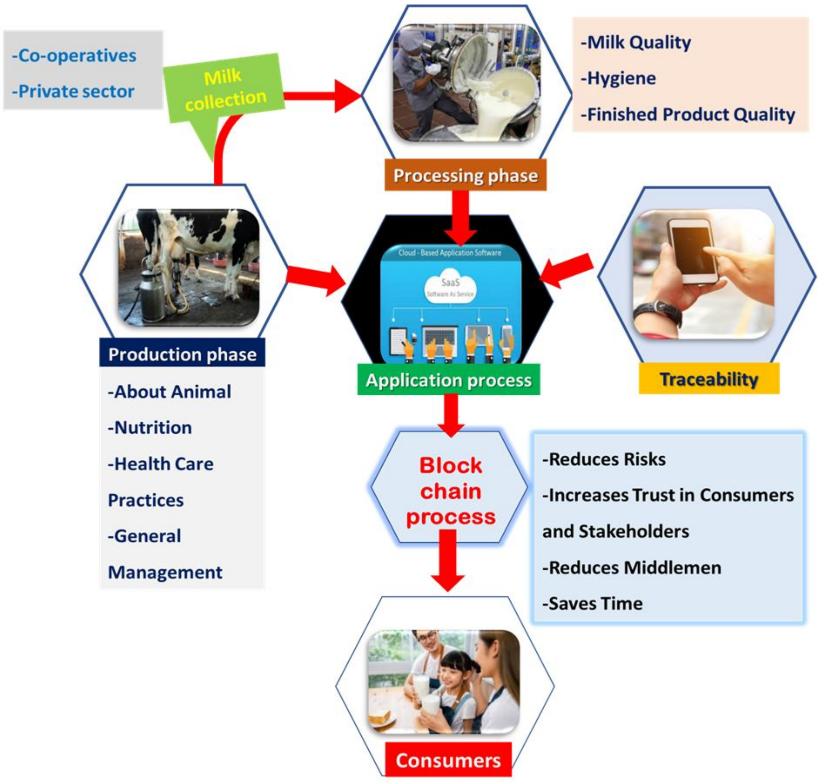

Fig. 2. Proposed working model of Blockchain technology for Indian dairy industry

Processing phase at the cooperative and industrial level: Indian dairy sector accounts for the milk collections mainly done through middlemen who directly sell to consumers/industries or the milk collection by cooperatives or industry personnel. However, majorly the collection is done by cooperative societies (Rajendran and Mohanty, 2004; Daud *et al.*, 2015). After receiving raw produce from different farmers, milk may be subjected to various tests to check its quality and other parameters. Non-standard produce may be subjected to some alternate usage, and produce that meets standard norms may be moved for further processing. In this phase, the herdsman may be informed about the animals and their farms where the production is done. In this way, corrective measures may be applied at an early stage. Additionally, improved nutritional steps may also be formulated in a similar way. Several issues, such as sub-clinical mastitis and other problems, may be investigated through lab tests at early stages through milk testing (Fröhling *et al.*, 2010). Further, the information regarding chilling of raw milk and different products will be recorded. Corresponding data regarding particular milk samples will help in improving the quality and shelf life of finished products. From this phase, information regarding processing steps, nutrient value, date of packaging, storage temperature, and shelf life of the finished product may be obtained.

Application phase of Blockchain process: In this phase, various processed data of particular processed milk and its whole journey, right from nutrition to animal, animals' management, collection process, and associated test results, are to be streamlined and put in codes. One animal's product will be assigned a unique code possessing its information, which will be accessible to its end users. Whenever an end consumer wishes, he/she may check the details of the purchased products. All these processes will be based on a software platform that allows the user to interface by scanning a QR code or by clicking the embedded link (Mangla *et al.*, 2021).

Examples of usage of some BCT in livestock sector

US, China, Switzerland and South Korea are some of the major user nations of BCT among others (Blockchain Council, 2024). Walmart and Kroger are the first companies which adopted Blockchain technologies in their management (Kamilaris *et al.*, 2019). Huge companies, such as Nestlé, Tyson Foods, Unilever, etc., have been utilizing BCT. It was proposed (Tian, 2017) that BCT be integrated with the Internet of Things for improved monitoring and traceability of food products.

Generally, in the Blockchain models, the companies use a unique QR code to access the information embedded in it (Kamilaris *et al.*, 2019; Casino *et al.*, 2021). Multinational agricultural giants such as Cargill Inc. are utilizing BCT to let their customers know about produced turkey from farms to their table with animal welfare (Bunge, 2017). In Australia, the firm Paddock to Plate, which was founded in 2008, uses this technology for beef production and consumption chain, and the consumers may monitor each process involved from the farm to the final production (Campbell, 2017). In China, JD.com and InterAgri, a leading exporter of Australian meat products, have collaboratively started using Blockchain technology for greater traceability and transparency regarding produced pure Black Angus beef, and the companies lay claim to higher confidence in consumers (JD.com Blog, 2018). Another example can be taken from Gogochicken, wherein the company asserts that their chicken is farmed in free-range conditions as supported by the data of individual chickens with the use of GPS devices attached to the bird's legs. Company uses this data for traceability from Blockchain process and aims at building its trust and scaling its production to more than 2 crores of birds per year in coming three years (Adele Peter, 2017). Top tech firms such as Walmart, JD.com, and IBM, along with Tsinghua University of Beijing, resorted to BCT for tracing pork supply in the Chinese supply chain in 2016 for food safety (Sristy, 2021). On the concept of traceability and transparency, cooperative company Grass Roots of Arkansas Livestock Farmers provides the consumers with details of meat through digital history regarding animals' manager, husbandry practices, feeds and how it has been processed through BCT with the support of Heifer USA (Coleman, 2021). In a recent study, Varriale *et al.* (2023) aimed to estimate the cost of integrating radio frequency identification, Internet of Things and Blockchain technology for supply chain management in cheese. They took cost analysis on six levels, namely dairy farm, 3rd party logistics, whole sellers and three retailers for logistics, warehouse and order management and reported an economic benefit ranging from 8 to 63%. A Switzerland-based study was conducted on NUTRIA, an application developed for the Swiss Dairy supply chain by Nia *et al.* (2021), wherein it was surveyed that 70% of candidates believed that transparency is an important aspect of the dairy supply chain (DSC), 70.59% candidates said that decentralized technologies such as BCT may increase trust in

Table 1. Some examples of BCT used for various purposes in dairy industry

Sl. No.	Key supply chain functionalities	Dairy products being catered	Related impact dimension	Reference
1	Traceability	Milk	Operations	Biscotti *et al.*, 2020
2	Traceability, Authenticity, Food Quality, Decentralized	Milk	Operations,Economic, Social	Casino *et al.*, 2021
3	Traceability, Authenticity	Milk	Operations and social	Nia *et al.*, 2021
4	Traceability, Decentralized, Transparency	Milk	Operations,Economic	Fang and Stone, 2021
5	Traceability, Decentralized	Cheese	Operations, Sustainability	Varavallo *et al.*, 2022
6	Traceability, Food Quality, Accountability, Product Authenticity, Automated Payment Settlements, Decentralized, Nutritional Value, Assurance	Milk, Cheese, Butter	Social, Economic, Operations, Sustainability	Khanna *et al.*, 2022
7	Transparency, fair payment, Decentralized	Milk	Social, Economic	Madhuri *et al.*, 2023
8	Transparency, Traceability	Milk	Social, Sustainability	Mangla *et al.*, 2021

consumers. They reported this technology as a low-cost tracing technology. Verde *et al.* (2023) conducted a study on combination of Internet of Things along with BCT to measure the improvement in safety of employees at dairy farm through it. They reported that personal protective equipment along with RFID chips showed a success rate of detection of boots from 3 m distance of more than 50%; for masks and goggles, it was around 100% from 2 m distance; for gloves, the success rate was 100% at 0.5 m and 64% at 1.5 m distance, respectively. Other examples of BCT used for various purposes in the dairy industry have been shown in Table 1.

Challenges in the adoption of BCT

BCT is still developing in many nations and lacks skilled personnel for various operations, with many professionals unaware of development tools. Interconnecting multiple Blockchains for a single problem is an open research area. Trust among stakeholders is a major issue, and Blockchain does not meet proper standards for organization and country-level transactions. Scalability is a key problem, with lower transaction speeds limiting real-world implementation (Galvez *et al.*, 2018). Sufficient financial resources are lacking for infrastructure and operations, and proper legislation is needed to protect citizens' rights. Cryptocurrencies are still illegal in many countries, and onboarding local stakeholders is a challenge for Blockchain-based supply chain management platforms.

Although BCT offers factors like traceability, transparency, trust, knowledge sharing, non-editable data, auditable processes, quality assurance, automation, and removing intermediate to the consumers, cyber security and data protection must be the priority to avoid hacking of sensitive information. However, utilization of Blockchain technology will have to face certain issues like organizational adoption, skill gap, trust issues, lack of standardization, scalability issues, need for financial resources, regulatory body, compliance, identifying selling platforms, price fixation, prevention of food wastage and minimum required documentation. Sustainability issues include reusing resources, reducing wastage, and disposing of contaminated and adulterated milk and milk products. The role of government bodies, along with other market players, will also determine the future of this platform (Kamilaris *et al.*, 2019), especially in countries like India. Nonetheless, BCT has the potential to improve food safety and quality for consumers and may bring substantial improvement in this industry in the near future.

Opportunities from BCT in Indian dairy industry

BCT may lead to smart and digitalized dairy farming in India. More enhanced use of engineered devices (Singh *et al.*, 2021a) and artificial intelligence may be helpful in the estimation of sales, expected incomes, improvement in quality products and thus increased consumer satisfaction. Utilization of in-line milk testing before dissemination of raw milk or milk products may be helpful in obtaining quality products (Kent *et al.*, 2016). This may be useful in the early detection of subclinical mastitis or other problems in dairy animals, and hence, early solutions may be carried out. It will also reduce unnecessary time lag between producers and consumers (Galvez *et al*., 2018). Thus, improved quality production, and export potential may be increased. Pressure over unnecessary paperwork may be relieved, which will considerably help in reducing deforestation (Kumar *et al*., 2022). To acquire good raw milk, farmers lacking awareness may be discovered and need specific training and skills may be developed. These all will aid the economy of farmers and ultimately to the nation. Collectively, BCT may help in achieving the sustainable development goals of the United Nations Organization.

Need for extension intervention

India is still in the developing stage in terms of technology adoption as majority are small farmers practicing dairy farming (Chand *et al*., 2015). Milk collection and processing are mostly done by small-scale cooperative societies in which collection is done manually, and middlemen lead to more chances of adulteration and errors in recording data (Vincent *et al*., 2022). Small milk producers are included in both official and informal value chains; however, they are more closely linked to the former (Birthal *et al*., 2017). The Internet of Things (IoT), Artificial Intelligence (AI) and data-driven strategies are unfamiliar to most farmers (Javaid *et al*., 2022). Before introducing BCT in the dairy industry, all the stakeholders must be trained with the basic know-how of the Blockchain process (Henchion *et al*., 2022). Farmers tend to be unwilling to adopt something new and comfortable with practicing the age-old method of trustful practices (Khan *et al*., 2013). It is necessary to face the evolving globalization and technology breakthroughs (Aggarwal, 2011). India needs to continuously review its procedures, policies, and cultural practices in order to remain competitive in the global economy (Singh and Singh, 2015). Extension service is a necessary intervention to penetrate through all the stages of a supply chain system in order to improve the competency of all the stakeholders in the adoption of the BCT (Paliwal *et al*., 2020).

Inconsistent internet connectivity, insufficient tools, and inadequate inputs for demonstrations further hinder the successful implementation of BCT (Mangla *et al*., 2021). The demands of farmers and other stakeholders must be taken into consideration while designing technology diffusion approaches (Long *et al*., 2016). High-quality audio-visual aids and infrastructure must be distributed to facilitate the spread of technology (Khan *et al*., 2012). According to Davis and Rylance (2005), training should emphasize enterprise skills including market analysis, distribution, and business management. As the dairy producers contribute significantly to both agriculture and efficient animal husbandry operations, trainings that are technical, financial, or organizational in nature must be designed specifically for the specific dairy stakeholders (Raina *et al*., 2017). Although women play a key part in dairy farming, they have limited authority over livestock and products and given that rural women perform the majority of the nation's low-level operations, training on female empowerment is vital (Sidhu and Kaur, 2006; Pandey *et al*., 2024).

Proposal for future research

This review enlightens several future prospects for research, including, the adoption behaviour, knowledge, attitude, perception of different categories and gender of dairy farmers towards BCT; the economic aspects of BCT for implementing this technology for the dairy farming community; and investigations regarding the effect of farm size or herd size on the adoption of BCT by the farmers and other stakeholders.

Conclusions

Milk and milk products are high-quality nutritious food items that support the well-being of human and animal life. Improved animal-derived products that are transparent, traceable, and end-to-end detailed bring trust to the consumers. Continuous upgradation of practices that monitor and regulate the production and processing of food products will remain a challenge for the human race. However, the information laid in this manuscript will work as a one-step guide for the adaptation of Blockchain technology in the Indian dairy industry. The adoption of IoT and AI technologies can help the dairy sector meet consumer demand for high-quality dairy products while optimizing operations for milk farmers. By utilizing cutting-edge sensing and data-analyzing technology, the Internet of Things can reduce resource use, improve animal health, and reduce environmental problems. Compared to conventional methods, farmers are now able to make more profits through the use of Blockchain in agriculture. In the future, developing an agri-food system that is safer, more dependable, sustainable, and efficient can be achieved with the application of BCT. It is anticipated that BCT coupled with Internet of Things and artificial intelligence will bring substantial development towards intelligent dairying for enhanced food safety under Indian conditions.

Conflict of interest: Authors declare that they have no conflict of interest in the study.

Author's contribution: UK, AKS: Conceived the idea and conceptualized the design, drafted and edited the manuscript; AM, CB: Guided for drafting and editing; AP, PM, BB: Assisted in literature findings, graphical representations and referencing in this manuscript.

Data availability statement: No specific research data was used for the review article and information is compiled from the available literature.

ACKNOWLEDGEMENTS

The authors did not receive any specific funding for this work. However, the authors are thankful to the Director of the National Dairy Research Institute, Karnal and the Head of Eastern Regional Station, National Dairy Research Institute, Kalyani, for their guidance and support in the authors' academic prospects.

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Received- 03.05.2024, Accepted- 19.01.2025, Published-18.03.2025 (Online), 01.06.2025(Print)

Section Editor: Prof. L. Haldar, Editorial Board member