

## Use of emerging technologies like AI and Block Chain in dairy industries

The dairy industry has been increasingly exploring the integration of emerging technologies like Artificial Intelligence (AI) and blockchain to improve various aspects of production, supply chain management, quality control, and customer engagement. Here's how these technologies can be utilized:

### 1. AI in Dairy Farming:

**(i)- AI in Demand Forecasting:** Demand forecasting using AI in the dairy industry involves the application of advanced algorithms and machine learning techniques to analyze historical sales data, market trends, weather patterns, and other relevant factors to predict future demand for dairy products accurately. By leveraging AI, dairy companies can generate more precise forecasts, allowing them to optimize production schedules, manage inventory levels efficiently, and align supply with demand. AI models can identify patterns and correlations in large datasets, enabling companies to anticipate fluctuations in demand, seasonal variations, and emerging consumer preferences. This proactive approach to demand forecasting helps dairy businesses minimize stockouts, reduce excess inventory, and enhance overall operational agility, ultimately leading to improved customer satisfaction and increased profitability.

**(ii) - AI in Procurement Forecasting:** Procurement forecasting using AI in the dairy industry entails leveraging sophisticated algorithms and data analytics to predict the quantities of raw materials and ingredients required for production accurately. By analyzing historical procurement data, supplier performance metrics, market trends, and external factors such as weather patterns and geopolitical events, AI models can generate reliable forecasts of future procurement needs. These forecasts enable dairy companies to optimize their purchasing decisions, negotiate better contracts with suppliers, and mitigate risks associated with supply chain disruptions. Additionally, AI can identify potential cost-saving opportunities, optimize inventory levels, and enhance overall procurement efficiency. By adopting AI-driven procurement forecasting techniques, dairy businesses can streamline their supply chain operations, reduce costs, and ensure a steady and uninterrupted flow of essential ingredients, ultimately improving their competitiveness and profitability in the market.

**(iii) - AI in Livestock Management:** Livestock forecasting using AI in the dairy industry involves utilizing advanced algorithms and machine learning techniques to predict key factors related to dairy cattle, such as milk production, health status, fertility, and feed requirements. AI models can analyze a variety of data sources, including historical production records, environmental conditions, genetic information, and real-time sensor data from wearable devices, to forecast future performance and make informed decisions regarding herd management. For example, AI can predict optimal breeding times, identify health issues early, optimize feed formulations based on nutritional needs, and forecast milk production levels. By leveraging AI-driven livestock forecasting, dairy farmers can improve operational efficiency, reduce costs, and enhance overall herd health and productivity, ultimately leading to increased profitability and sustainability in the dairy industry.

**(iv) - AI for Smart Feeding Systems:** A smart feeding system using AI in the dairy industry revolutionizes traditional feeding practices by employing advanced algorithms and data analytics to optimize feed formulation and delivery for dairy cattle. These systems utilize various sensors, including those monitoring individual cow behavior, body condition, milk production levels, and nutritional requirements, to collect real-time data. AI algorithms then analyze this data to generate personalized feeding recommendations tailored to each cow's specific needs. By considering factors such as age, weight, lactation stage, and health status, smart feeding systems can precisely calculate the ideal feed composition and portion sizes, minimizing waste and maximizing nutrient utilization. Additionally, AI continuously learns and adapts to changing conditions, enabling dynamic adjustments to feeding strategies over time. By implementing smart feeding systems powered by AI, dairy farmers can improve feed efficiency, optimize herd health, and enhance overall productivity and profitability in the industry.

## **2. Blockchain in Dairy Supply Chain:**

**(i)- Traceability and Transparency:** Implementing blockchain technology in the dairy industry enhances traceability and transparency throughout the supply chain by creating an immutable and transparent record of transactions and data. Each stage of the dairy production process, from farm to processing facility to distribution and retail, can be securely recorded on the blockchain. This includes information about the origin of the milk, farming practices, transportation routes, processing methods, and storage conditions. By scanning a QR code or accessing an online platform, consumers can easily trace the journey of the dairy product they purchased, gaining insights into its production history and authenticity. Blockchain ensures that this information cannot be altered or tampered with, fostering trust and accountability among stakeholders. Moreover, blockchain enables rapid and targeted recalls in the event of a food safety issue, as authorities can quickly identify the affected products and their sources. Overall, blockchain technology promotes greater transparency, accountability, and consumer confidence in the dairy industry supply chain.

**(ii) - Quality Control:** By utilizing blockchain technology in the dairy industry, every aspect of the production process, from milk collection to transportation and processing, is meticulously recorded, providing an immutable and transparent record of compliance with quality standards and regulations. Each step is timestamped and linked in a decentralized ledger, ensuring that no data can be tampered with or manipulated. This level of transparency allows stakeholders to verify the authenticity and integrity of dairy products, fostering trust among consumers and regulatory authorities. Additionally, blockchain enables swift identification and resolution of quality control issues, leading to improved product quality and safety across the dairy supply chain.

**(iii)- Food Safety:** Blockchain technology in the dairy industry serves as a crucial tool for enhancing food safety by creating an immutable record of product movements. In the event of contamination or a foodborne illness outbreak, blockchain provides a tamper-proof ledger that traces the entire journey of dairy products from farm to table. This transparency enables rapid identification of affected batches, facilitating targeted recalls and minimizing the spread of contaminated products. By accessing real-time data on the blockchain, authorities can swiftly pinpoint the source of the

issue, mitigate its impact, and ensure consumer safety. Blockchain's transparency and traceability significantly enhance the responsiveness and effectiveness of food safety measures in the dairy industry. By leveraging AI and blockchain technologies, dairy companies can improve operational efficiency, ensure product quality and safety, enhance consumer confidence, and drive innovation in the industry. However, it's essential for stakeholders to address challenges related to data privacy, interoperability, and adoption barriers to realize the full potential of these technologies.

#### **Financial implications involved**

<b>S.No.</b>	<b>Type of Technology</b>	<b>Financials(Approx)</b>
1.	Implementation of AI with paid/unpaid tools	INR 20,00,000
2.	Implementation of Blockchain with Machine integration	INR 25,00,000