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Agro Daily Milk Management

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Abstract: ***Agro Milk Management is a digital dairy record automation system designed to replace manual registers and error-prone spreadsheets used in small and medium dairies. The solution is developed with a Web-based Dairy Owner/Admin dashboard and an Android Farmer application, integrated using Firebase Authentication and Firebase Realtime Database for secure access and real-time data synchronization. The admin dashboard enables dairy owners to register farmers with unique token IDs, record daily milk collection with fat-based rate calculation, manage supplement/expense deductions, and generate weekly payment settlements automatically. The farmer Android app provides transparent, secure access to personal daily entries, weekly payout statements, and deduction history, improving trust and reducing financial disputes. The system supports scalable multi-dairy isolation, ensures accurate automated calculations, and prepares a foundation for future analytics and milk supply forecasting, enabling efficient, data-driven dairy operations.***

Keywords: Dairy Management System, Milk Collection, Farmer Mobile App, Admin Web Dashboard, Firebase Authentication, Firebase Realtime Database, Fat-Based Rate Calculation, Weekly Settlement, Deductions Management, Real-Time Records, Multi-Dairy Data Isolation, Transparency Automation.

I. INTRODUCTION

Milk collection and payment management is the backbone of any dairy, especially in rural and semi-urban regions where hundreds of farmers supply milk daily. Even today, many small and medium-scale dairies maintain farmer records, milk entries, fat calculations, and weekly payments using manual registers or basic spreadsheets. While this approach works for a small number of farmers, it becomes unreliable and slow as the dairy grows. Common issues include incorrect fat-based rate calculations, missing entries, delayed weekly settlements, and confusion in supplement or advance deductions. These errors often lead to payment disputes and reduce trust between farmers and dairy owners. Another major challenge is the lack of transparency. Farmers usually do not have direct access to their own milk supply records or deduction details and must depend on the dairy owner for updates. In practice, this creates communication gaps and suspicion, even when the dairy owner is honest. Additionally, manual methods increase the risk of data loss, damage of registers, and difficulty in tracking long-term history like monthly totals, payment trends, or farmer-wise performance. Dairies also struggle to make decisions such as planning storage capacity, estimating next week milk supply, or preparing cash flow for payouts because past data is not organized for analysis. To solve these challenges, Agro Milk Management is proposed as a secure, real-time, and scalable digital platform built using Web technology (HTML, CSS, JavaScript, Bootstrap) for the Dairy Owner/Admin dashboard and Android (Java/XML) for the Farmer application. The system uses Firebase Authentication to provide role-based login and Firebase Realtime Database to store and synchronize data instantly across devices. The Admin can manage farmer registration with unique token IDs, enter daily milk data with fat percentage, and generate accurate weekly settlements with automated deductions. The Farmer can securely view daily entries, weekly payment summaries, and deduction history anytime through the mobile app, ensuring full transparency. By automating calculations, organizing records, and enabling real-time access for both dairy owners and farmers, the proposed system reduces human errors, improves operational efficiency, strengthens trust, and supports future enhancements such as analytics dashboards and milk supply forecasting. This makes Agro Milk Management not just a record-keeping tool but a modern dairy operations system suitable for real-world deployment in growing dairy businesses.

II. LITERATURE SURVEY

1) *"Design of IoT-Based Milk Quality Monitoring and Payment System" — A. Kantardžić, N. Milić, I. Gazdić (IEEE MECO, 2021)*

This paper presents an IoT-integrated model for monitoring milk quality parameters and linking them with automated payment systems. It demonstrates how real-time data can be securely recorded and used for transparent, fat-based pricing, reducing disputes between farmers and dairy owners.

2) *"Forecasting Daily Milk Yield Using GA-LSTM Approach" — J. Yin, Y. Liu, H. Yang, et al. (IEEE ICSP, 2020)*

The authors apply a Genetic Algorithm–optimized Long Short-Term Memory (LSTM) model to predict daily milk yield from historical supply data. This supports data-driven planning in dairy operations and provides a foundation for predictive modules in smart dairy management systems.

3) *"Machine Learning-Based Demand Forecasting for Dairy Production Planning" — M. A. S. Bhuiyan, A. Goosuwan, S. Suwansaranyu (IEEE iEECON, 2022)*

This research integrates statistical and ML-based forecasting to optimize dairy production scheduling. Its methodology inspires the forecasting component in Agro Milk Management, helping anticipate milk demand and adjust resource utilization.

4) *"Heuristic Optimization of Milk Collection and Scheduling in Dairy Supply Chains" — S. Fadda, L. Goumiri, A. Yalaoui, et al. (IEEE CEC, 2020)*

The study explores efficient collection route and scheduling optimization using evolutionary algorithms. It supports future enhancements for automating collection logistics once the digital record base is established.

5) *"IoT-Enabled Smart Milk Quality and Fat Measurement System" — S. Saravanan, N. S. Raghava, G. S. Viswateja, et al. (IEEE ICSSAS, 2023)*

The paper details a low-cost IoT-based milk quality assessment model capable of recording fat and SNF values in real-time. The concept of linking these metrics directly to farmer records forms the technical inspiration for automated fat-based payment calculation in the proposed project.

6) *"Capacitive Sensing System for Real-Time Milk Quality Analysis" — S. Gireesh, A. R. Nair, J. R. Menon, et al. (IEEE IATMSI, 2025)*

This study introduces a capacitive sensor-based approach to determine milk purity and fat concentration. Integrating similar mechanisms into digital dairy systems ensures accuracy, fairness, and transparency in pricing models.

7) *"Optimization of Milk-Run Logistics for Perishable Supply Chains" — J. S. Fan, K. M. Ng, H. Y. Wong (IEEE ICMSE, 2013)*

This paper discusses efficient vehicle routing for perishable goods such as milk. Its findings highlight how automated digital records of milk quantity and timing can enhance scheduling accuracy in collection and delivery processes.

8) *"AI-Driven Milk Adulteration Detection Using Spectroscopy and Statistical Modelling" — V. Patil, S. Bhosale (IEEE ESCI, 2025)*

Zhe paper presents an AI-based method for detecting milk adulteration using spectroscopy and predictive analytics. The concept reinforces the importance of trustworthy quality tracking, aligning with Agro Milk Management's goal of creating transparency in dairy transactions.

III. METHODOLOGY

The development of Agro Milk Management follows a structured methodology where the Dairy Owner/Admin operates the system using a Web dashboard, and the Farmer accesses personal records through an Android application. The solution is implemented using Firebase Authentication for secure login and Firebase Realtime Database for storing and synchronizing records in real time.

At the beginning, the complete dairy workflow is analyzed in practical terms—how farmers are registered, how daily milk quantity and fat are recorded, how rates are decided, how deductions are managed, and how weekly payments are calculated. Based on this workflow, the system is divided into two clearly defined roles. The Owner/Admin role is responsible for adding and managing farmer profiles, entering milk collection data, issuing supplement/expense deductions, and generating weekly settlement reports. The Farmer role is limited to viewing their own daily entries, weekly payment summaries, and deduction details to ensure transparency and trust.

After the workflow is finalized, the system is designed using a multi-dairy structure so that each dairy's data remains private and separated. When an owner creates an account, the system generates a unique dairy identifier (dairyId). All farmers, milk entries, deductions, and settlement records are stored under this dairyId inside Firebase Realtime Database. This design ensures that even if multiple dairies use the same platform, their data never overlaps.

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Authentication is implemented next. The web dashboard provides an email and password login for the dairy owner. The Android farmer application uses phone number verification (OTP) so that farmers can securely access their accounts using their registered mobile number. After login, the system validates the user role and maps it to the correct dairy and farmer profile. Role-based access control ensures that the admin can access only their dairy's data, while a farmer can access only their own records.

Once access control is ready, the web dashboard modules are implemented. The admin can register farmers and assign each one a unique token ID for quick search and daily entry speed. During daily milk entry, the owner selects the farmer using the token ID, enters the milk quantity and fat percentage, and the system automatically calculates the rate and total amount using a predefined fat-rate chart. This automation eliminates manual calculation errors. If supplements or expenses are given to a farmer, the owner records them as deductions. At the end of each week, the system generates a settlement by summing daily totals, subtracting deductions, and storing the final payable amount in the weekly report.

In parallel, the farmer Android application is developed to provide complete transparency. After login, it reads data directly from Firebase and displays the farmer's daily milk history, weekly settlements, and deduction records. The farmer is not allowed to modify entries, which avoids manipulation and ensures integrity of records. Since Firebase Realtime Database provides real-time synchronization, the farmer receives updated information immediately after the owner saves entries or generates weekly settlements.

Finally, testing is performed module-wise to ensure accuracy and reliability. Authentication and role verification are tested first, followed by farmer registration, daily entry correctness, fat-rate calculation validation, deduction tracking, and weekly settlement generation. Additional testing includes handling invalid logins, missing data, network interruption cases, and verifying that farmers cannot view any other farmer's records. After successful testing, the system is deployed with Firebase as the backend, the web dashboard hosted (optional), and the farmer Android app packaged as an APK for installation and use.

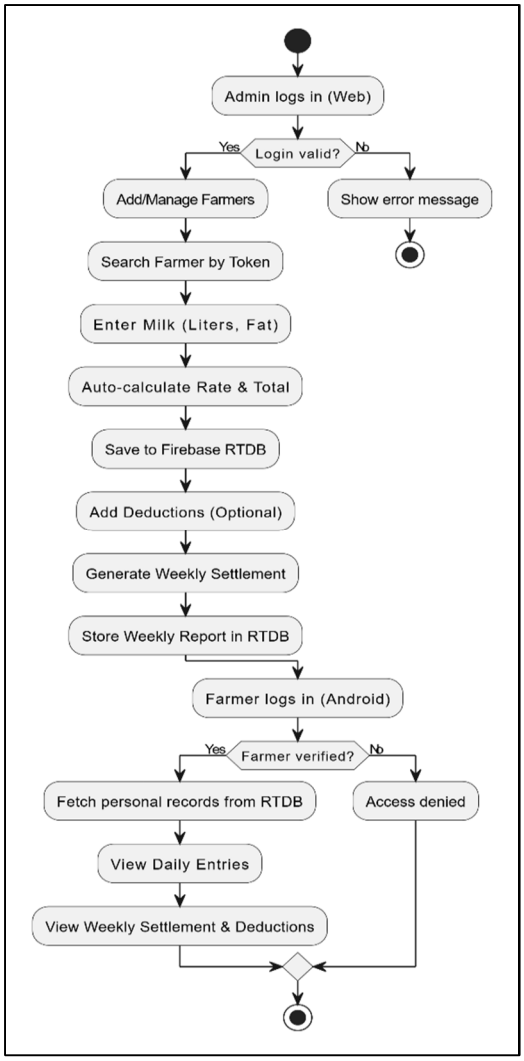


Fig1: Flow Diagram

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IV. WORKING

Agro Milk Management works as a two-platform system where the Dairy Owner/Admin manages operations on a Web dashboard and the Farmer views records on an Android app. Both platforms are connected through Firebase Authentication and Firebase Realtime Database, which ensures secure login and real-time syncing of entries.

First, the Dairy Owner/Admin logs in on the web dashboard using secure credentials. After login, the system loads only that dairy's data using a unique dairyId, so records remain private and separated from other dairies. The admin then registers farmers by entering details such as name, phone number, and address. During registration, the system assigns each farmer a unique 4-digit token ID, which becomes the farmer's identity for fast daily entry.

Every day, when a farmer supplies milk, the admin opens the Daily Milk Entry section on the web. The admin searches the farmer using the token ID, enters the milk quantity (liters) and fat percentage, and the system automatically calculates the rate per liter using the fat-rate chart defined for that dairy. Based on this, the system calculates the total amount for that entry and saves it instantly into Firebase with the date and time. If any wrong entry is made, the admin can update or delete it, ensuring clean records.

If the dairy provides the farmer with supplement bags, medicine, or advance money, the admin records it under the Deductions module. Each deduction entry includes amount, date, and type, so the deduction process stays transparent and trackable. At the end of the week, the admin generates the Weekly Settlement for all farmers. The system totals all daily milk amounts for the selected week, subtracts the registered deductions, and produces the final net payable amount for each farmer. This weekly report is stored in Firebase, preventing manual calculation mistakes and ensuring consistent payouts.

On the farmer side, the Android application allows farmers to login securely (preferably using phone OTP). After login, the farmer's account is mapped to their farmer profile and dairy. The farmer can then view their daily milk entries, including liters, fat, rate, and total price. They can also view weekly settlement reports, showing gross payment, deductions, and final payable amount. Since the database updates in real time, farmers can see new entries and settlements immediately after the admin saves them, ensuring trust and reducing disputes.

Overall, the system works by converting all manual record-keeping into a digital workflow where the admin performs entries and settlement generation, and the farmer receives transparent access to personal data, making the dairy operation faster, more accurate, and more reliable.

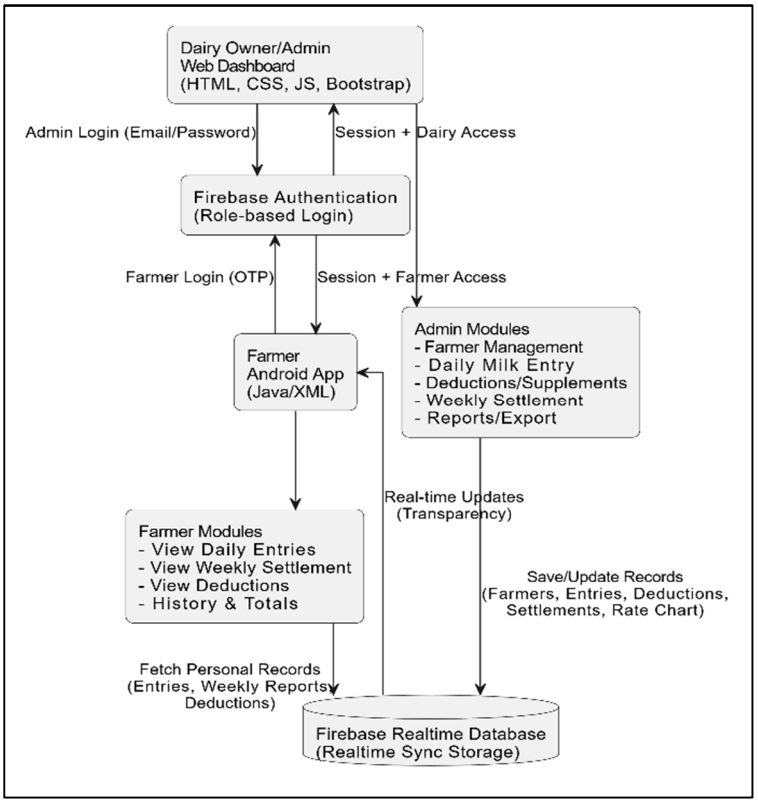


Fig 2 : Block Diagram

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V. RESULTS & ANALYSIS

The Agro Milk Management system was implemented with a Web-based Dairy Owner/Admin dashboard and an Android Farmer application, integrated through Firebase Authentication and Firebase Realtime Database. After development, the system was tested using multiple farmer records and daily milk entries to evaluate correctness, speed, transparency, and data consistency.

The results show that the web dashboard successfully handled farmer registration with unique token IDs, enabling quick search and faster daily entry without typing full farmer names. During daily milk entry, the system correctly calculated fat-based rate and total amount using the configured rate chart. Compared to manual register methods, the automated calculation eliminated common errors such as wrong multiplication, incorrect fat-rate mapping, and missing totals.

Weekly settlements were generated accurately by summarizing daily entries and deducting supplement/advance costs. This reduced time spent on weekly calculations and improved fairness because every deduction was visible and traceable. A major improvement observed was transparency: farmers could instantly view their daily records and weekly payout reports in the Android app immediately after the admin saved them. This real-time access reduced dependency on the owner for updates and minimized disputes. From a performance perspective, Firebase Realtime Database provided fast syncing between web and mobile. In most test cases, updates reflected on the farmer app within seconds, proving the system's suitability for day-to-day dairy operations. The role-based access ensured that farmers could only view their own data, maintaining privacy and preventing misuse.

Overall, the analysis confirms that the proposed system improves efficiency, reduces errors, ensures data security, and strengthens trust between dairy owners and farmers by providing accurate automation and real-time record visibility.

A. Performance Summary

Feature / Parameter	Manual Method (Register/Excel)	Proposed System (Web + Android + Firebase)	Result / Impact
Daily milk entry speed	Slow (writing + calculations)	Fast (token search + auto total)	Saves time, smoother operations
Payment calculation accuracy	Error-prone (manual multiplication, wrong rates)	Auto fat-rate calculation + total	Reduces disputes, improves accuracy
Weekly settlement preparation	Takes long, difficult for 100+ farmers	Auto weekly summary + deductions	Faster payouts, consistent reports
Transparency for farmer	Farmer depends on owner for records	Farmer app shows real-time entries	Higher trust, fewer arguments
Deduction handling (supplements/advance)	Often unclear, not traceable	Logged with date/type/amount	Fair and verifiable deductions
Data safety	Register can be lost/damaged	Cloud storage with authentication	Reliable and secure records
Scalability	Hard beyond 50–100 farmers	Designed for 100+ farmers per dairy	Better management as dairy grows

VI. CONCLUSION AND FUTURE WORK

The Agro Milk Management successfully delivers a secure and transparent solution for dairy record handling by combining a Web-based Admin dashboard with an Android Farmer application using Firebase Authentication and Firebase Realtime Database. The system automates key operations such as farmer registration with token IDs, daily milk entry with fat-based rate calculation, deduction tracking, and weekly settlement generation. This reduces manual workload, minimizes calculation errors, improves record organization, and strengthens trust by allowing farmers to view their own daily and weekly records in real time. Overall, the proposed system proves effective for small and medium dairies that need accurate, scalable, and reliable digital management.

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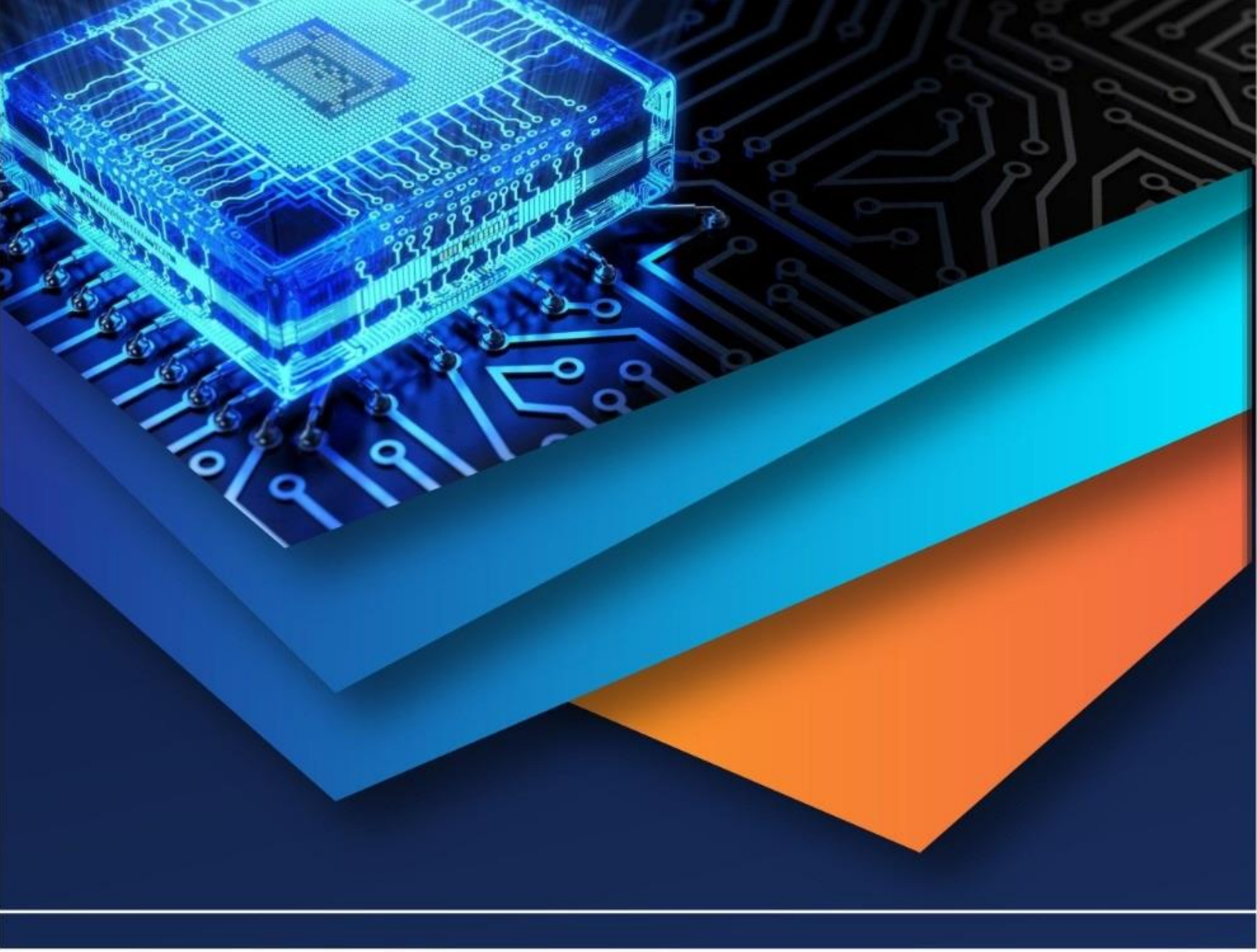
A. Future Work

In future versions, the system can be enhanced by adding advanced analytics dashboards, automatic SMS/WhatsApp statement sharing, and PDF invoice/settlement downloads for farmers. A milk supply prediction module can be improved using stronger machine learning models for better forecasting. Additional upgrades may include barcode/QR-based token scanning, collection route planning, offline mode with sync, and integration with digital payment gateways to support direct farmer payouts and complete end-to-end dairy automation.

REFERENCES

[1] A. Kantardžić, N. Milić, and I. Gazdić, "Design of IoT-Based Milk Quality Monitoring and Payment System," Proc. IEEE MECO Conf., 2021.
[2] J. Yin, Y. Liu, H. Yang, and X. Li, "Forecasting Daily Milk Yield Using GA-LSTM Approach," Proc. IEEE ICSP Conf., 2020.
[3] M. A. S. Bhuiyan, A. Goosuwan, and S. Suwansaranyu, "Machine Learning-Based Demand Forecasting for Dairy Production Planning," Proc. IEEE iEECON Conf., 2022.
[4] S. Fadda, L. Goumiri, and A. Yalaoui, "Heuristic Optimization of Milk Collection and Scheduling in Dairy Supply Chains," Proc. IEEE CEC Conf., 2020.
[5] S. Saravanan, N. S. Raghava, and G. S. Viswateja, "IoT-Enabled Smart Milk Quality and Fat Measurement System," Proc. IEEE ICSSAS Conf., 2023.
[6] S. Gireesh, A. R. Nair, and J. R. Menon, "Capacitive Sensing System for Real-Time Milk Quality Analysis," Proc. IEEE IATMSI Conf., 2025.
[7] J. S. Fan, K. M. Ng, and H. Y. Wong, "Optimization of Milk-Run Logistics for Perishable Supply Chains," Proc. IEEE ICMSE Conf., 2013.
[8] V. Patil and S. Bhosale, "AI-Driven Milk Adulteration Detection Using Spectroscopy and Statistical Modelling," Proc. IEEE ESCI Conf., 2025.
[9] K. Prasad and A. Rao, "Automation of Dairy Data Using Cloud-Based IoT Solutions," Proc. IEEE ICECCT Conf., 2022.
[10] R. Reddy, P. Kumar, and A. Singh, "Smart Dairy Monitoring System Using Embedded Sensors," Proc. IEEE ICACCS Conf., 2020.
[11] N. Sharma and V. Gupta, "Design of Real-Time Data Acquisition System for Milk Collection Centers," Proc. IEEE INDICON Conf., 2019.
[12] D. Dutta and A. Bandyopadhyay, "Use of Cloud Computing in Agricultural and Dairy Information Systems," Proc. IEEE IC3 Conf., 2018.
[13] R. Tiwari, A. Raj, and S. Chaturvedi, "IoT Based Dairy Farm Automation and Milk Yield Monitoring," Proc. IEEE ICSET Conf., 2021.
[14] P. Das and N. Banerjee, "A Sensor Network Approach for Dairy Product Quality Control," Proc. IEEE ICETET Conf., 2020.
[15] A. Kumar and R. Verma, "Development of a Cloud-Based Smart Dairy Management Framework," Proc. IEEE ICICT Conf., 2021.
[16] M. Pandey, S. Sharma, and P. Jain, "Application of Machine Learning for Milk Quality Prediction," Proc. IEEE ICMLA Conf., 2022.
[17] G. Ramesh and R. K. Mishra, "Web-Based Information System for Rural Dairy Cooperatives," Proc. IEEE TENCON Conf., 2018.
[18] T. Subramani, S. Ravi, and M. Ramachandran, "Smart Milk Collection and Billing Using IoT," Proc. IEEE ICRTEC Conf., 2021.
[19] A. Patel and K. Shah, "Fat-Based Milk Pricing Using Real-Time Sensors and Firebase," Proc. IEEE ICACCI Conf., 2023.
[20] M. Hussain, N. Ahmed, and K. Parveen, "Secure Cloud Data Management for Dairy Industries," Proc. IEEE ICCCNT Conf., 2021.
[21] B. Reddy and R. Iyer, "Design of Digital Milk Accounting and Payment System Using Firebase," Proc. IEEE ICECA Conf., 2023.
[22] S. Patra and R. Ghosh, "Predictive Analysis of Milk Supply Chain Using Regression Models," Proc. IEEE ICSSP Conf., 2020.
[23] V. Kumar, P. Meena, and R. Singh, "Blockchain Enabled Transparent Payment System for Dairy Farmers," Proc. IEEE ICOIN Conf., 2024.
[24] A. Sharma and R. Chauhan, "IoT and Cloud Integration for Smart Agriculture and Dairy Management," Proc. IEEE ICCCIS Conf., 2022.
[25] L. Rao, D. Patel, and S. Mehta, "Real-Time Mobile Application for Milk Collection Using Firebase Realtime Database," Proc. IEEE ICICICT Conf., 2023.

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