Vol 7 No 2 June 2026 Pages 28-31 e-ISSN 2708-5694

Journal of Agriculture, Food and Environment (JAFE)

Journal Homepage: https://journal.safebd.org/index.php/jafe

https://doi.org/10.47440/jafe.2026.

Short Communication

OPEN ACCESS

Cloud-Based Digital Transformation of Dairy Research: The DDRP-BLRI Integrated Data Recording System

Talukder MAI[1] and Shahjahan M[2,3*]

[1]Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka 1341, Bangladesh
[2]Dairy Development Research Project (DDRP), BLRI Regional Station, Baghabari, Sirajganj 6770, Bangladesh
[3]Lal Teer Livestock Development (BD) Limited, Uthura, Bhaluka, Mymensingh 2240, Bangladesh

Article History

Received: 16 April 2026

Accepted: 19 June 2026

Published: 30 June 2026

***Corresponding Author**

Shahjahan M, E-mail: sajubau@gmail.com

Keywords

Cloud computing, dairy cattle, livestock management information system, mobile data collection, GPS tracking

How to cite: Talukder MAI and Shahjahan M 2026: Cloud-Based Digital Transformation of Dairy Research: The DDRP-BLRI Integrated Data Recording System. J. Agric. Food Environ. 7(2): 28-31.

A B S T R A C T

Effective data management is fundamental to conducting high-quality livestock research. In response to the lack of systematic data recording in the dairy sector of Bangladesh, a mobile and web-based digital data recording application was developed and implemented for the Dairy Development Research Project (DDRP) of the Bangladesh Livestock Research Institute (BLRI). The application enabled comprehensive data collection across four key domains: breeding and reproduction, nutrition and feeding, animal health, and socioeconomic aspects of farm households. Data could be recorded using mobile devices in both online and offline modes or through a web console, and all entered data were securely stored in a cloud-based server. Stored records could be downloaded in Excel or PDF format for further statistical analysis. The mobile interface comprised 18 functional modules: 11 for active data input and 7 for auxiliary tasks. Additionally, the web console was organized into 5 comprehensive management modules: Dashboard, Profile, Service, Report, and Preference. Mobile device access was controlled through administrator approval using system-generated user credentials, ensuring data security and accountability. Similarly, web-based access for desktop users was granted through unique login credentials with customized permission levels. A key feature of the system was its Global Positioning System (GPS) based mapping, which displayed the geographic distribution of enrolled cattle and farm households in real time. Overall, the DDRP-BLRI integrated data recording system represented a scalable model, multidisciplinary digital platform capable of enhancing research efficiency across both rural community settings and on-station research environments in Bangladesh.

INTRODUCTION

Data recording is utmost important for farm management and conducting research. With the exception of a few research stations, data recording is not available in the dairy sector of Bangladesh, while it can be done well with the utilization of digital data recording. Information and communications technology (ICT) is becoming increasingly globally especially in the urban areas and providing the necessary basis for sustainability and resilience of the smart communication (Khan *et al.*, 2015) by the rapid increase of internet facilities. Despite significant advances in precision agriculture through the integration of Internet of Things (IoT) devices and remote sensing technologies, precision ranching for extensive livestock systems remains comparatively underdeveloped (Bakir *et al.*, 2026).

Given the widespread use of mobile phones, mobile-based applications have emerged as a practical and accessible tool for data recording and management (Resti *et al.*, 2024). Sajjad *et al.* (2017) mentioned that mobile devices are playing an essential role in our daily life which could connect with cloud for exchanging data known as Mobile Cloud Computing (MCC) for conducting transmission between humans or between the devices or between the humans and devices. The Farm Management Information

Systems (FMISs) are considered as an important tool for the management of farm businesses which adopts to collect both internal and external data for supporting decision making to manage efficiently farm management and operations (Yang *et al.*, 2018).

The key utility of such digital innovations lies in strengthening the management information system (MIS) by enabling online real time data collection. As digitalization is one of the prime visions of the Government of Bangladesh, it can use for documentation and processing of research activities across scattered locations ranging from research stations to community villages through digital devices to bring about ease and efficiency in its operational systems. Thus, the Dairy Development Research Project (DDRP) of Bangladesh Livestock Research Institute (BLRI) looked for database software to establish a digital data recording system leading its smart dairy research initiatives. The software has been executed to input farm and community-based research data via mobile (online and offline) and web under the construction of SourceTrace System (STS, Massachusetts, USA).

MATERIALS AND METHODS

The data recording system (Figure 1) of DDRP-BLRI applications included genotype-based pedigree history of individual cattle with climate resilient parameters. This software incorporated 11 active modules including cattle enrollment, calf enrollment, breeding and reproduction, body condition, characterization, dairy characteristics, growth, health, cattle population, milking cows and semen characteristics (Figure 2). In addition, there were 7 supporting modules including weather information, cattle list, transaction summary, settings, change password, logout and exit for facilitating enumerator works by mobile applications. This software enabled to capture farm pictures with GPS coordinates and physical positioning on maps, in addition, input (feeding, vaccinations, deworming etc.) and output tracking (milk yield, physio-chemical parameters of milk and semen, growth etc.). Additionally, it had been using for breed history tracking that would contribute to develop a digital cattle herd book for individual animal considering a lifetime certificate. After inputting primary data in that software, all those data were downloaded either by Excel or PDF format from the report section of this application to analyze further.

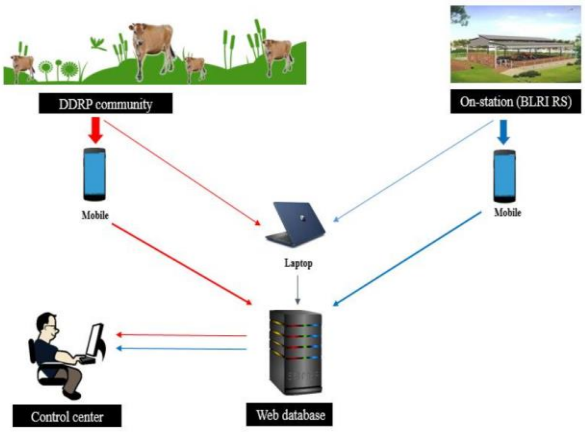


Figure 1: Data recording system using DDRP-BLRI applications

RESULTS AND DISCUSSION

Device connection

To collect field or research data via mobile device, users had to first download the application from a secure web link. This software incorporated 11 active modules including cattle enrollment, calf enrollment, breeding and reproduction, body condition, characterization, dairy characteristics, growth, health, cattle population, milking cows and semen characteristics (Figure 2). Once the app was installed and launched, the user entered a system-generated ID and password. This ID then appeared in the web console, where an administrator had to manually approve the specific mobile device to grant access. Additionally, the administrator could share a web link for desktop users. In this instance, the admin provided unique credentials with customized access limitations. Once a device was successfully connected and authorized, the application was ready to collect and store data within the cloud-based system. Sajjad *et al.* (2017) stated that such role-based access control and administrator-mediated device authorization were recognized as essential security features in mobile cloud computing environments.

Management of web console

The web console was managed through five core modules, each containing several sub-modules that drive the application's functionality (Figure 2). A brief description of these modules follows. This modular architecture mirrors the structure recommended for Farm Management Information Systems (FMISs), which integrated internal and external data streams to support multifaceted decision-making in agricultural research (Yang *et al.*, 2018):

a. Dashboard: This module provided a high-level overview, displaying the total number of connected devices and the current enrollment figures for cattle and calves. It also featured integrated location tracking via Google Maps to visualize the distribution of enrolled livestock and households (Figure 3). Real-time geospatial visualization of field data through cloud-connected dashboards was a hallmark of smart city and big data analytics frameworks (Khan *et al.*, 2015).

b. Profile: This module was used to manage and edit various farm catalogs. It maintained a comprehensive list of enrolled farmers and cattle populations whether entered via mobile or web and categorizes them by location and specific data-entry seasons.

c. Service: Serving as a web-based alternative to mobile data collection, this module was used for direct data entry and consists of ten specialized sub-modules.

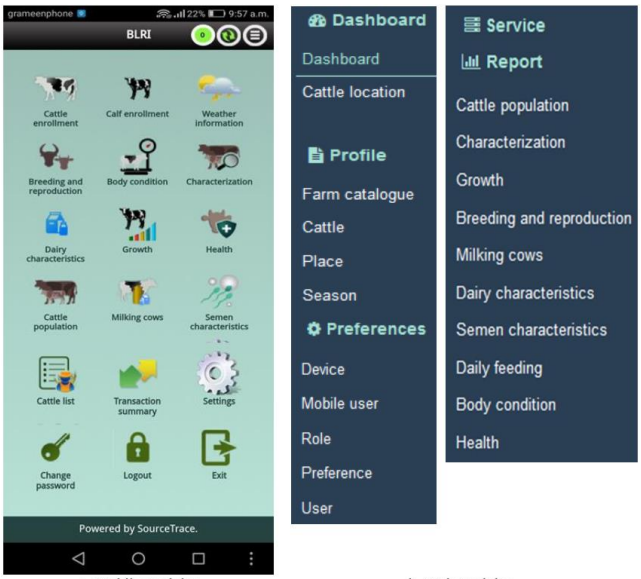
d. Report: This module acted as the final verification step. Users could review all enrolled data for accuracy before downloading reports in either Excel or PDF format.

e. Preference: Primarily an administrative tool, this module allowed the admin to manage access levels for both web and mobile users through five distinct sub-modules.

Use of mobile devices in data collection or input

There were total 18 modules (Figure 2) showed in the mobile devices where 11 modules have a number of fields (Figure 4) in which few are mandatory to fill. The rest of 7 modules were used to check the data entry or manage the language or weather forecast or exit/entry. The integration of mandatory

and optional fields across multiple modules ensured data completeness while reducing enumerator burden, a design principle consistent with best practices in mobile-based agricultural data collection systems (Berckmans, 2014).



a. Mobile modules b. Web modules

Figure 2: Modules of DDRP-BLRI applications in mobile (a) and web (b) system

a b

Figure 3: GPS tracking of cattle in the map: (a) at BLRI on-station, Sirajganj, and (b) community at Bera, Pabna district of Bangladesh

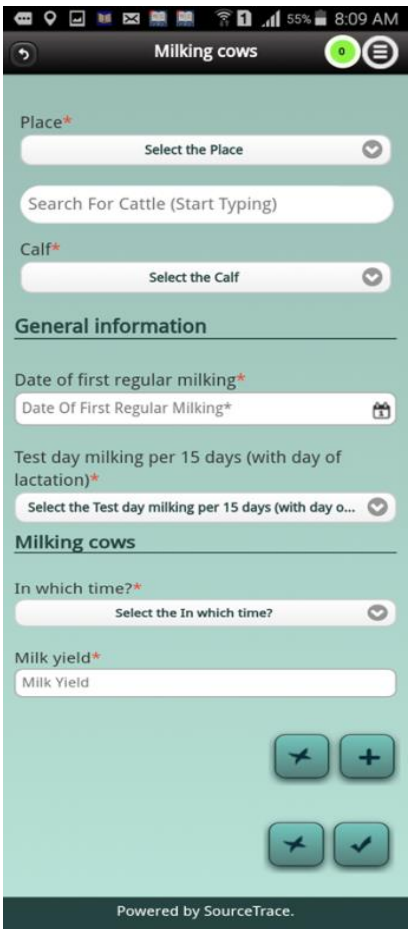


Figure 4: The way of data recording system via mobile device (*e.g.* milking cows' module)

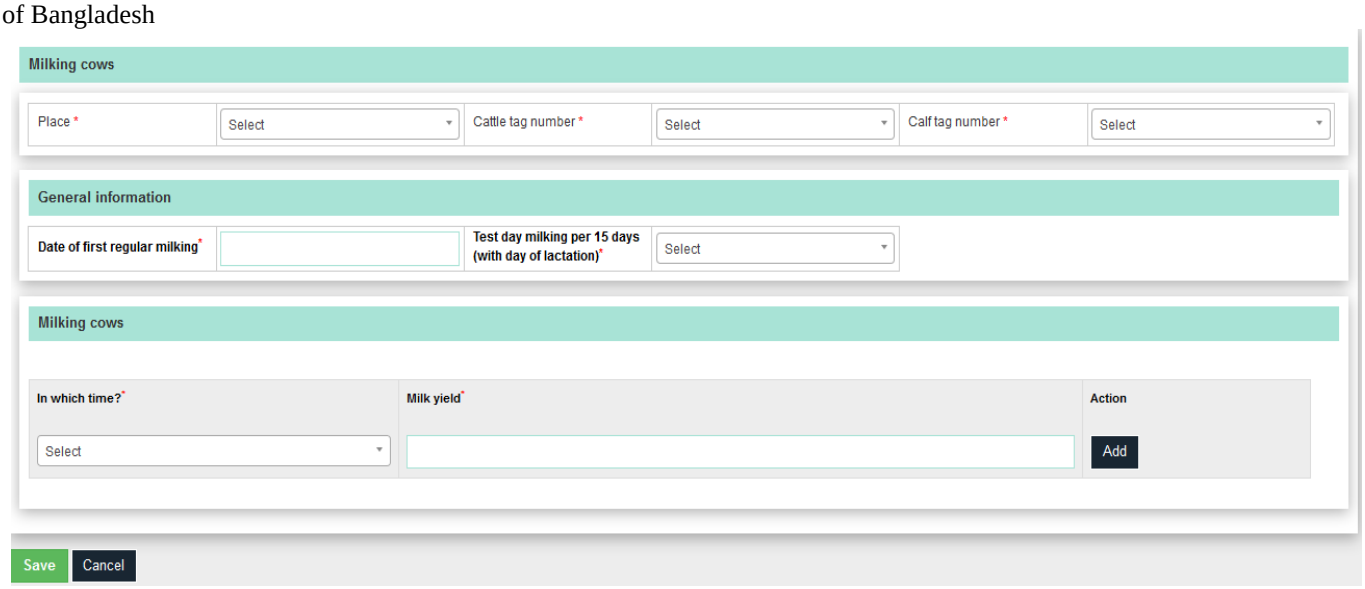
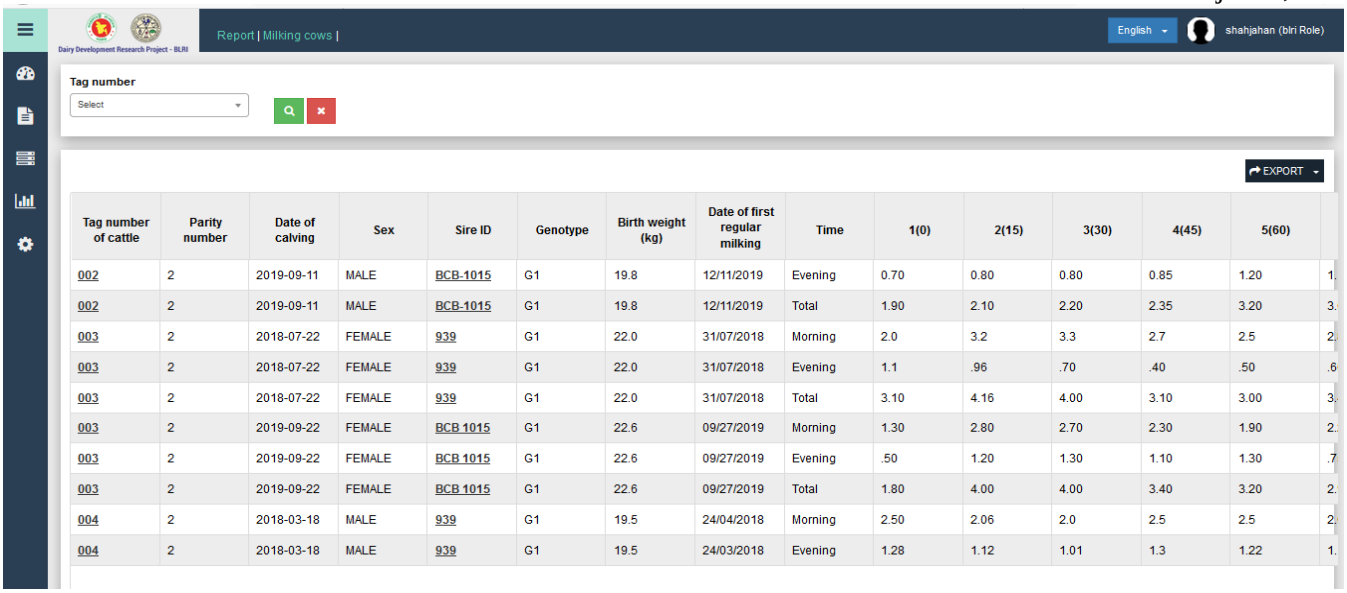


Figure 5: The way of data recording system via web (*e.g.* milking cows' module)



Tag number of cattle	Parity number	Date of calving	Sex	Sire ID	Genotype	Birth weight (kg)	Date of first regular milking	Time	1(0)	2(15)	3(30)	4(45)	5(60)
002	2	2019-09-11	MALE	BCB-1015	G1	19.8	12/11/2019	Evening	0.70	0.80	0.80	0.85	1.20
002	2	2019-09-11	MALE	BCB-1015	G1	19.8	12/11/2019	Total	1.90	2.10	2.20	2.35	3.20
003	2	2018-07-22	FEMALE	939	G1	22.0	31/07/2018	Morning	2.0	3.2	3.3	2.7	2.5
003	2	2018-07-22	FEMALE	939	G1	22.0	31/07/2018	Evening	1.1	.96	.70	.40	.50
003	2	2018-07-22	FEMALE	939	G1	22.0	31/07/2018	Total	3.10	4.16	4.00	3.10	3.00
003	2	2019-09-22	FEMALE	BCB 1015	G1	22.6	09/27/2019	Morning	1.30	2.80	2.70	2.30	1.90
003	2	2019-09-22	FEMALE	BCB 1015	G1	22.6	09/27/2019	Evening	.50	1.20	1.30	1.10	1.30
003	2	2019-09-22	FEMALE	BCB 1015	G1	22.6	09/27/2019	Total	1.80	4.00	4.00	3.40	3.20
004	2	2018-03-18	MALE	939	G1	19.5	24/04/2018	Morning	2.50	2.06	2.0	2.5	2.5
004	2	2018-03-18	MALE	939	G1	19.5	24/03/2018	Evening	1.28	1.12	1.01	1.3	1.22

Figure 6: Enrolled data in the downloaded file for analysis (*e.g.* milking cows' module)

Use of web console in data collection or input

Alike the mobile device web page of this application contented with respective modules having similar fields (Figure 5) which could be filled through computer including data editing facilities. However, daily feeding module was added in web page rather than mobile devices because of data recording necessity or usefulness.

Use of web for checking/downloading report

The list of enrolled farmers and cattle in details could be downloaded in Excel format from the "Farmer" and "Cattle" sub-modules, respectively, under Profile. Inside the individual cattle profile there were specific options for calf and cattle herd book where all the productive and reproductive information of individual cattle were generated. In addition, all the sub-modules belong to "Report" modules were allowed to download respective reports in both Excel and PDF format (Figure 6).

CONCLUSION

The DDRP-BLRI application serves as a comprehensive digital data recording platform as a model, designed to streamline surveys, breed development, conservation efforts, and the monitoring of herd book, animal nutrition, growth, and health. By enabling simultaneous data entry and real-time reporting like this application, the platform facilitates seamless collaboration between breeders, nutritionists, veterinarians and economists ensuring a multidisciplinary approach to livestock research and management.

ACKNOWLEDGEMENTS

The authors are grateful to the Dairy Development Research Project of Bangladesh Livestock Research Institute for required funding to conduct this research work.

REFERENCES

Bakir ME, Perea AR, Funk M, Rahman S, Spetter MJ, Macon L, Cox A, Estell RE, Cao H, Cibils AF, Spiegal SA 2026: A scalable, end-to-end IoT and remote sensing platform for precision rangeland and livestock management. *Computers and Electronics in Agriculture* **247**: 111615.

Berckmans D 2014: Precision livestock farming technologies for welfare management in intensive livestock systems. *Revue Scientifique et Technique (International Office of Epizootics)* **33**: 189–196.

Khan Z, Anjum A, Soomro K, Tahir MA 2015: Towards cloud based big data analytics for smart future cities. *Journal of Cloud Computing* **4**: 1–11.

Resti Y, Reynoso GG, Probst L, Indriasari S, Mindara GP, Hakim A, Wurzinger M 2024: A review of on-farm recording tools for smallholder dairy farming in developing countries. *Tropical Animal Health and Production* **56**: 168.

Sajjad T, Owais SM, Umar M, Ferzund J 2017: Integrating mobile cloud computing with big data to enhance health care analytics. *International Journal of Computer Science and Network* **17**: 141–145.

Yang F, Wang K, Han Y, Qiao Z 2018: A cloud-based digital farm management system for vegetable production process management and quality traceability. *Sustainability* **10**: 4007.