Advancing national livestock traceability: development and rollout of Rwanda's first cattle identification and registration

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The overall objective of the initiative was to design and operationalize a centralized, web-based national cattle database capable of supporting traceability, performance monitoring, and sector-wide analytics. More specifically, the system was intended to enable comprehensive farm and individual animal identification, record lifecycle events including reproduction, health, production, and ownership movements, and generate automated fertility and productivity indicators for both management and policy purposes.

The National Cattle Identification and Registration System was developed through collaboration between Rwanda Agriculture and Animal Resources Development Board, Royal Jersey Agriculture and Horticulture Society, and PAN Livestock Services Ltd. Functional specifications were aligned with Rwanda's livestock systems, administrative hierarchy, and diverse ownership models. Built on SQL Server architecture and customized from established livestock recording platforms, the centralized, internet-based database supports real-time multi-user access. Field data are entered via smartphones, tablets, or computers and synchronized to a secure cloud server hosted within Rwanda, ensuring data sovereignty. The system integrates four modules: (1) farm registration with unique premises IDs and GPS coordinates; (2) animal identification using unique ear tags (RFID-ready), recording breed, sex, birth date, pedigree, ownership, and full lifecycle traceability; (3) configurable event recording for reproduction, health, and production data; and (4) embedded analytics with automated KPIs (e.g., age at first calving, conception rate, milk yield, growth, disease incidence) plus rule-based alerts linking insemination, pregnancy diagnosis, and calving projections. Rolled out nationally from October 2021 following multi-zone piloting, implementation included training IT staff, national trainers, and over 1,000 enumerators to standardize digital data capture. To date, 1,417,328 cattle have been registered. Females comprise 78.5%, reflecting Rwanda's dairy orientation. Breed data were recorded for 766,288 animals: 61% Holstein-Friesian and crosses, 17% indigenous breeds, 12% Jersey and crosses, 3% Sahiwal and crosses, 3% Jersey × Friesian, and small proportions of Brown Swiss, Fleckvieh, and Brahman. Dairy bloodlines represent about 77% of recorded breeds, indicating strong genetic upgrading. Strategically, the platform strengthens traceability, disease surveillance, AI monitoring, movement control, and market regulation. Priorities include complete lifecycle updating, improved breed data, sustainable financing, multi-species expansion, and alignment with international recording standards. The system establishes a scalable foundation for genetic improvement, productivity growth, and evidence-based livestock governance.