सत्यमेव जयते

Government of India
Ministry of Fisheries Animal Husbandry & Dairying
Department of Animal Husbandry & Dairying

Livestock Traceability in India

by

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LIVESTOCK & DAIRYING SECTOR

- Market size ~ Rs 15.63 trillion growing >8% annually
- Nearly 5% of GVA & 31% of total agri sector
- World's largest milk producer, 222 million MT / year
- Over 100 million farmers, mainly small and marginal
- Equitable growth through cooperatives, >75% value to farmers, women empowerment ~ 75 million engaged in sector
- Per capita milk availability 444 g per day.

CHALLENGES

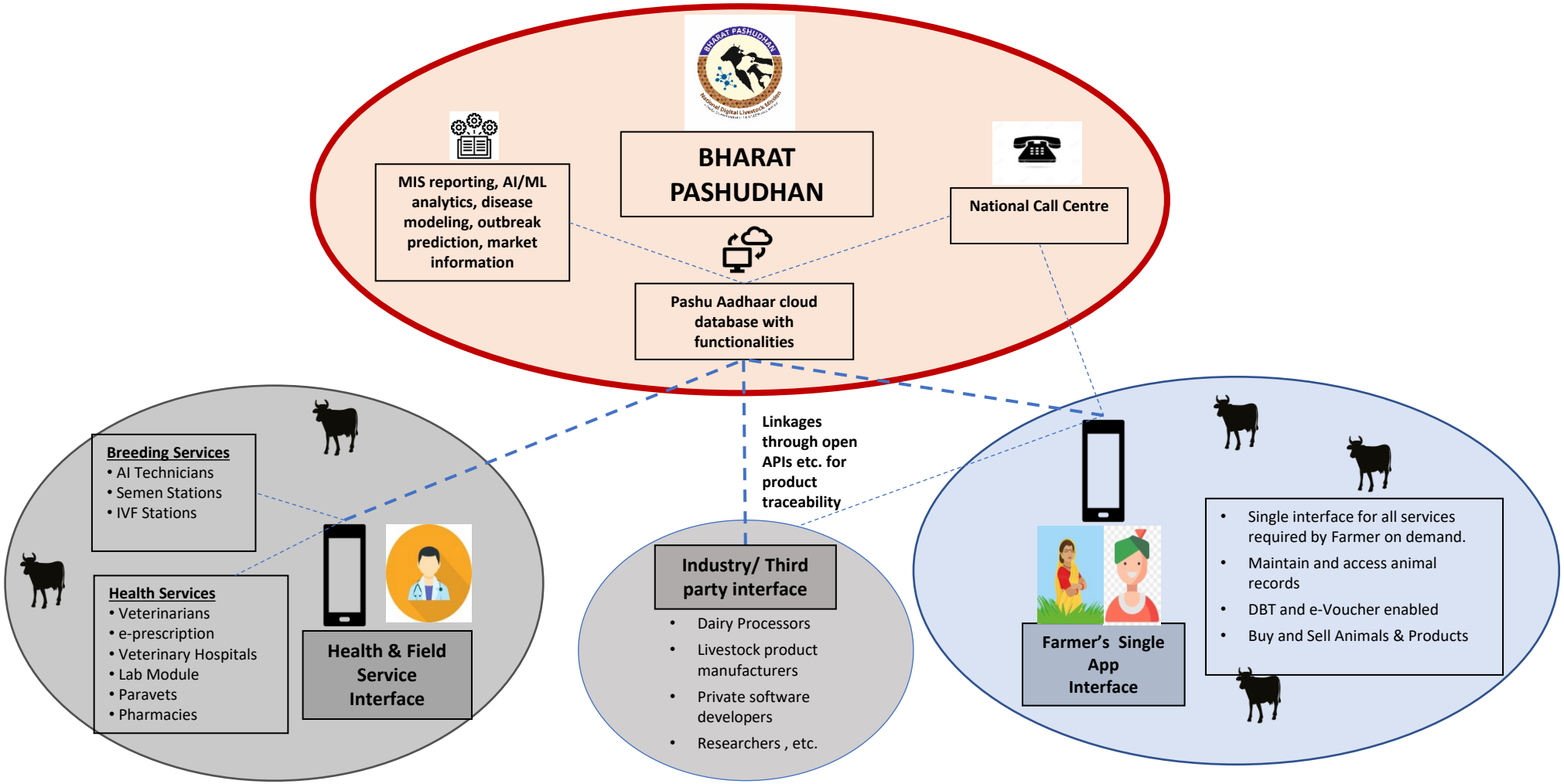
- Scattered ownership with average holding of 2-3 bovines.
- Farmers have limited means to ask for services and have limited access to widespread information.
- Artificial insemination (AI) & breed improvement services on the rise but not pervasive and not adequately regulated due to lack of information through integrated channels.
- All this leads to Low productivity - 2048 kg vs world average 2600 kg
- Disease reporting mechanisms needs strengthening.

Concept of National Digital Livestock Mission (NDLM)

Project Conceptualized under the name **“Bharat Pashudhan”** by DAHD and NDDB under overall guidance from office of Principal Scientific Advisor to Hon’ble Prime Minister.

- At present a unique 12-digit Tag ID is being allotted to livestock and out of an 303 million bovines nearly 286.5 million (95%) tagged and this database is available for integrating it for various activities.
- NDLM has been conceptualized to form an integrated IT ecosystem for the livestock sector based on this unique Tag ID database.
- This is one of the largest initiatives for tagging livestock animals spread over a wide geographical area
- Knowing its importance, the Livestock farmers have adopted this system without any administrative intervention.

STRUCTURE OF NDLM



Functionalities available in Phase 1 - Modules

Animal Management

- Owner Registration
- Animal Registration
- Ownership Transfer
- Ear Tag Change
- Modify Owner Details
- Modify Animal Details

Animal Health

- Animal Treatment/Surgery
- Vaccination
- Deworming
- First Aid
- Disease Testing
- Disease Reporting - Intimation Report
- Disease Reporting - FIR
- Disease Reporting- Outbreak Follow up
- Post-mortem
- Campaign Creation

Animal Breeding

- Artificial Insemination
- Pregnancy Diagnosis
- Calving
- ET - Embryo Master
- ET - Animal synchronization
- ET - Heat Transaction
- ET - Embryo transfer
- Bull Master/Semen Straw Mngt
- Test AI plan
- Milk Schedule
- Milk Recording
- Milk Sampling
- Growth monitoring & Typing

Admin Module

- Organization Setup
- Sub Organization Setup
- Project Management
- User Management
- Role Management
- Hierarchy Management

Upcoming Modules in Phase II

Animal Nutrition

Tag Management

Lab Management

Stock Management

Call Centre Integration

All the functionalities in NDLM are based on the Tag ID as a Primary key and all transactions are entered in the Database against the Tag ID only.

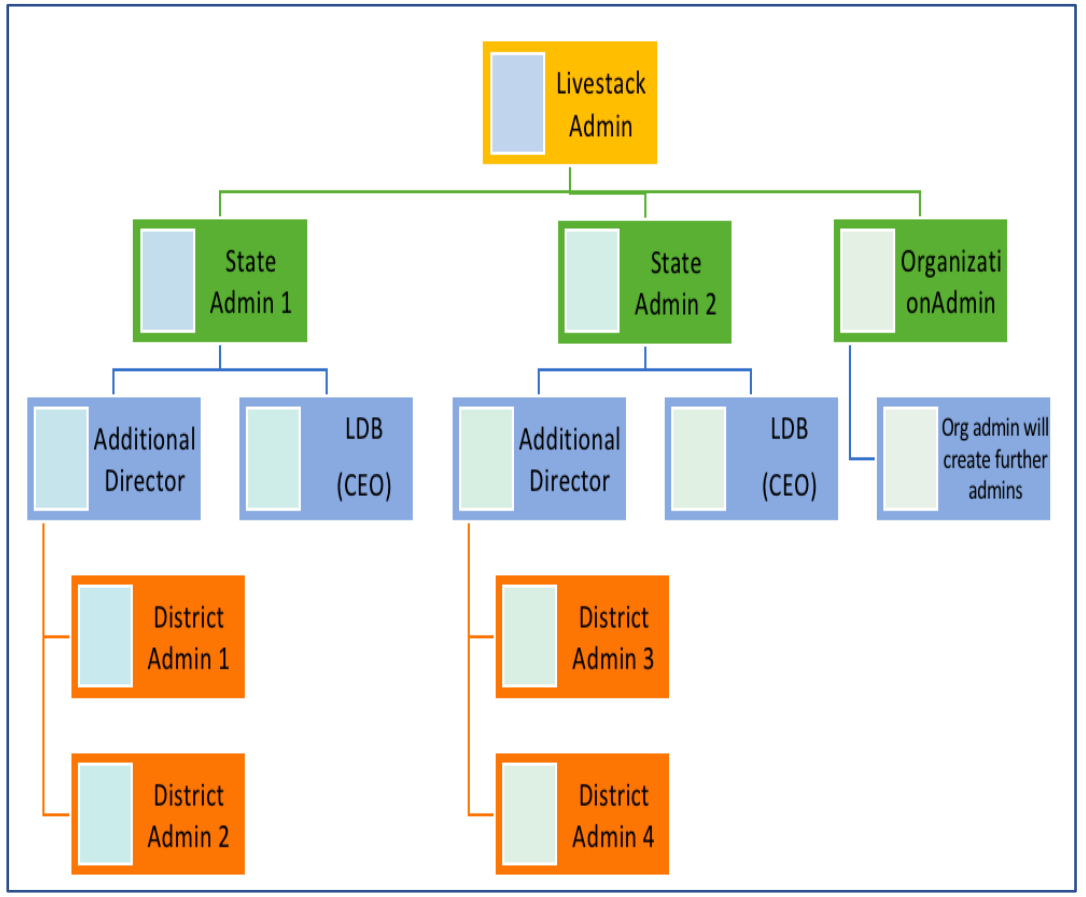
Traceability in NDLM

- Traceability is one of the main concept for building National Digital Livestock Mission (NDLM)

- For each Livestock Animal traceability has been built at following levels:
  - Field User/Worker
  - Animal Owner/Farmer
  - Livestock Animal

How a User ID for Field Worker is made

- In NDLM for capturing the field activities Bharat Pashudhan App/Web interface has been introduced for the field work force.
- For accessing this application they are assigned User IDs
- Application has been developed in a complete de-centralized manner wherein all administrative and reporting control are entrusted to State Admins of the respective states.
- The State Admins create User IDs for their workforce.



Main Features of User IDs

1. Every user is assigned a Single User ID for lifetime till he works with the organization.
2. Aadhar and Photo is mandatory to avoid duplication.
3. In case of change/transfer User ID remains the same area is to be changed.
4. If a user leaves the organization the ID should be deactivated.
5. For new Users/Joinees fresh ID is to be created.

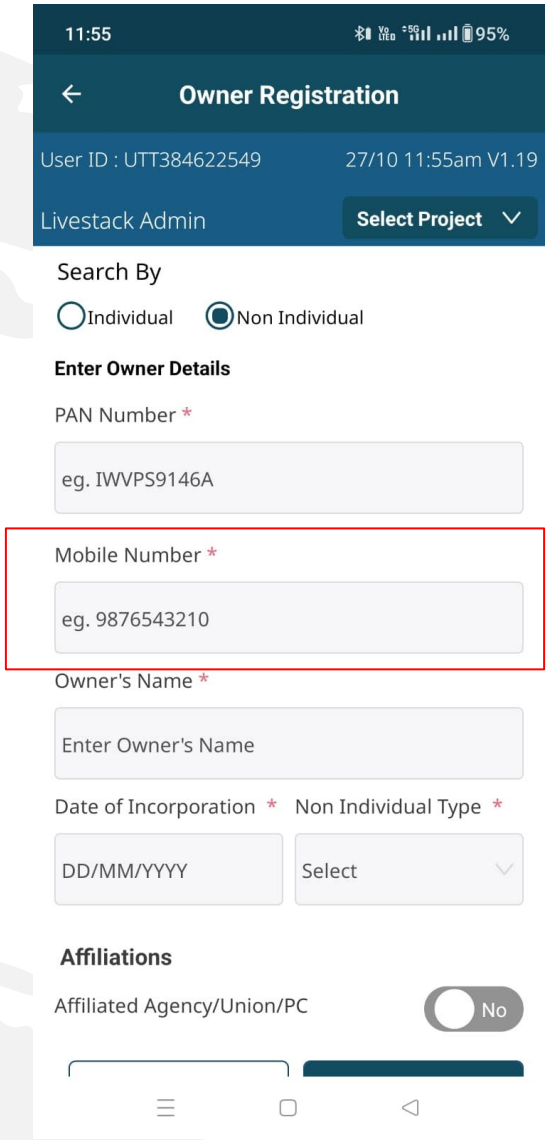
Traceability of User IDs

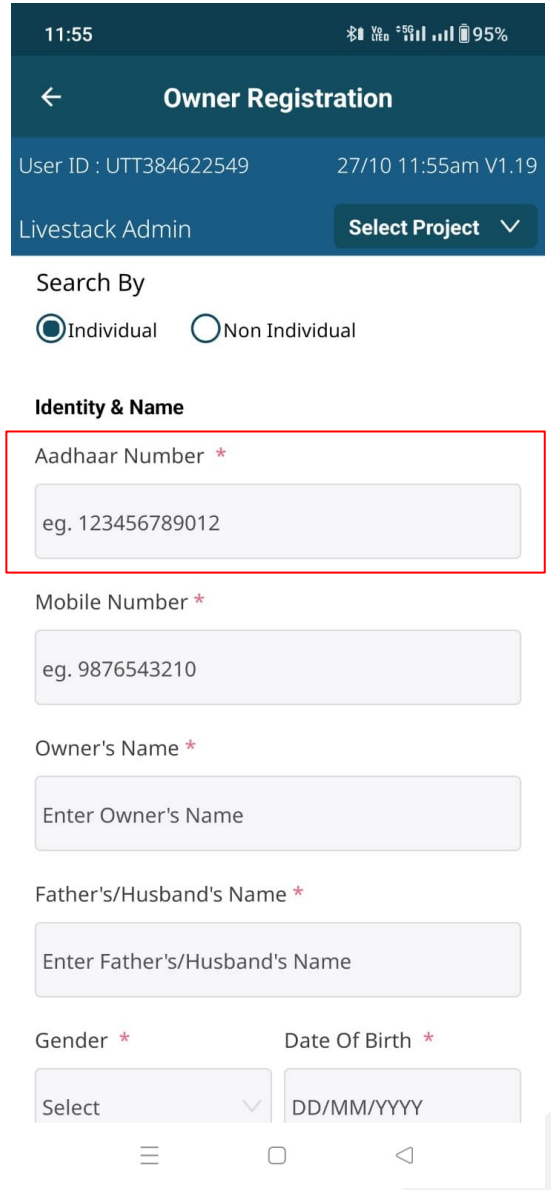
1. No transaction can be recorded in the system without Logging in through a valid User ID created by respective application admin.
2. Each transaction captures the User ID while recording the details.
3. Thus complete audit trail of work for each worker is available.

Registration of Owners / Livestock Farmers

- **Livestock Farmer is created by a User by logging in with his/her User ID.**
- **For creation of Owners following are mandatory:**
  - **Aadhar number which is validated for duplicity at the time of data entry.**
  - **Mobile number which is validated through an OTP.**
  - **A Unique Owner ID is generated by the system.**

Using above parameters Owner can be traced and tracked in the system.





Registration of Animals using 12 Digit Tag ID

Unique Animal Identification (UAID)

पशु आधार

Technical Specifications of Tag ID

Sr. No.	Description
1	**Description**: The ear tag composed of two parts (Male + Female). The male part is a button with a diameter of 27 mm (±2mm). The male part should have a metal point. The size of the female piece should be comprised between 55 x 65 mm and 58 x 69 mm with a closed head.
2	• **Raw Material**: The tag should be made from Ether grade Thermoplastic Polyurethane Elastomer material that should be resistant to ultraviolet light, high and low temperature, impossible to reopen by wrench and should be tamperproof. • The manufacturer should provide documentation from the independent and recognized sources to demonstrate the non-resolvability of its tags. Pull test certificate for the ear tag with minimum 28KgF pull test force shall be furnished at the time of submitting technical bid.
3	**Weight**: The weight of the ear tag (male+female) should be 7 grams (+/- 10%).
4	Printing (Laser): 1st Line : One dimensional Barcode with encoding 128, 10mm high (+/-1mm). 2nd Line : A row of 6 digits, 10mm high (+/-1mm). 3rd Line : A row of 6 digits, 18mm high (+/-1mm).
5	Numbers and bar code should be covering full size of the female tag and leaving 2 mm margin on all sides.
6	The printing must be as dark as possible to ensure the readability of the bar code over the years. The manufacturer should provide documentation to demonstrate the readability of its tags over the years. Animal Breeding (AB) Group, NDDB will send the list of twelve-digit numbers to be laser printed on ear tags.
7	**Colour** : The colour of the tag should be lemon yellow
8	**Packing** : In order to manage the tag inventory the eartag should be packed in batches of 100 pieces in a good quality polyethylene bags indicating beginning and ending numbers and further packed in a **corrugated box containing 500 pieces of ear tags i.e. 5 polyethylene bags each containing 100 pieces of ear tags**.
9	**Ear Tag Applicator**: **Compatible Universal applicator with 1 extra pin along with the ear tags should also be supplied**.
10	**Ear Tag-Test Report-** a) Ether Grade Test Report is required to be provided at the time of supply (Finished good) b) Manufacturer' test certificate should be attached with the proposal (Raw Material)

Procedure for 12 Digit Codes Generation centrally by NDDB

Institution/ Service Provider

2. Request for Eartag Number

1. Issue Eartag Purchase Order

3. Delivery of Eartag Number

4. Supply of Eartags.

Eartag Manufacturer

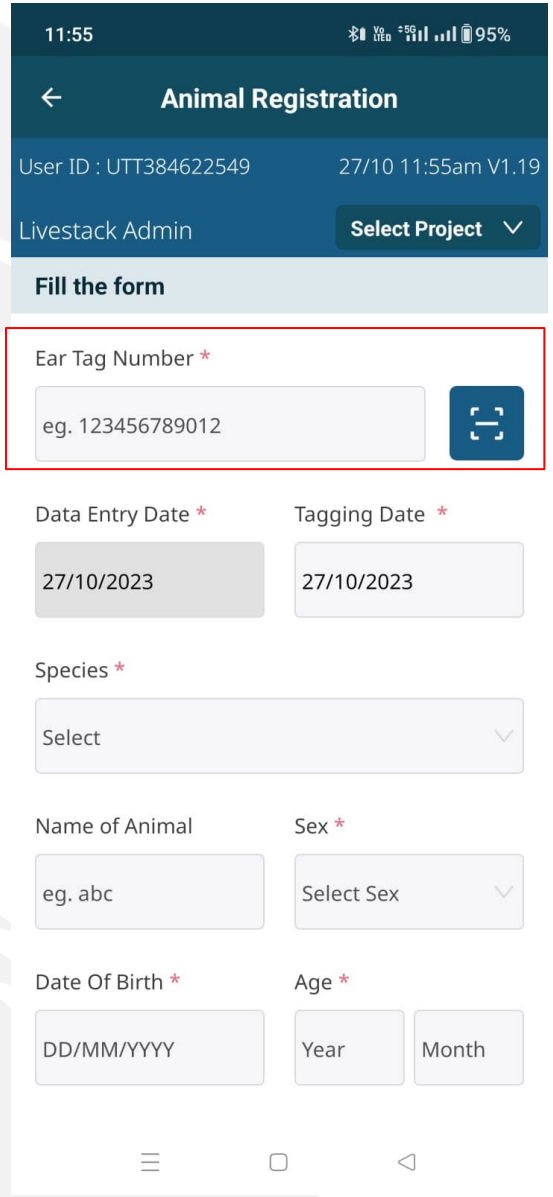
5. Delivery of Eartags to AI Tech.

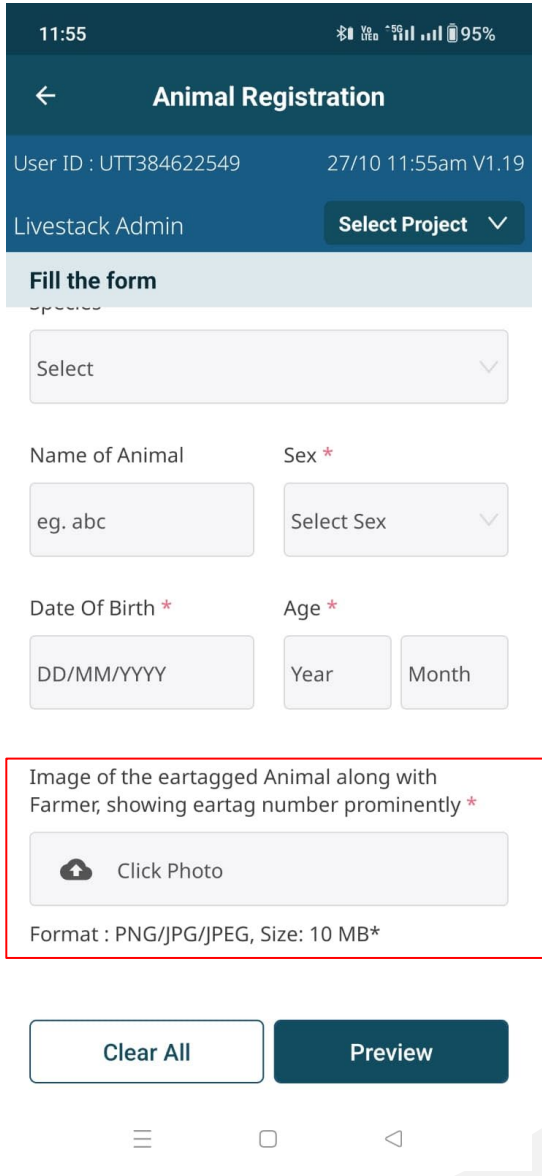
6. Eartagging of Animal

7. Data Entry in NDLM

Registration of Animal with 12 Digit Tag ID

- First Owner is registered thereafter animals are attached to this owner ID.
- This activity is done by a registered user only after logging in through his/her user ID.
- Requisite data is entered in respect of animal against the 12-digit ID assigned.
- A photo of animal is to be uploaded with that Tag ID for confirmation.
- After attaching it with a owner addition of animal is confirmed with an OTP received on the Owner's mobile number.





In-built Validations in NDLM for Tagging transaction

- Tag ID is checked whether it belongs to the series generated by NDDB and is activated.
- Tag ID is checked whether it has been used already in the field to avoid duplicity.
- Each animal can be tagged only against a Registered Owner, there can be no animal in the system without an owner.
- User after attaching Tag ID to animal have to capture a photograph in the Application clearly showing the animal with Tag.
- Each Tag entry is verified by an OTP received on the Registered Farmer’s mobile.

New born calf registration with 11 Digit Virtual ID

- New born calves are regisrtered at the time of calving transacation through a permanent 12 digit Tag ID.
- At times it is not feasible to physically Tag the newborn due to infection risks or other factors.
- In this case a 11 Digit Virtual Tag ID is allocated to the calf which is visible against the Owner ID and is valid for a period of 90 days.
- Using this virtual ID all vaccination and other transactions can be recorded.
- Within 90 days this 11 digit virtual ID is converted to a permanent 12 digit Tag ID through Eartag change transaction and the vaccination history gets tranferred to this permanent Tag ID for lifetime.
- At the time of Eartag change Photo is captured and is not required at the time of virtual ID tagging.

Using Tag ID for Recording Artificial Insemination

Artificial Insemination:

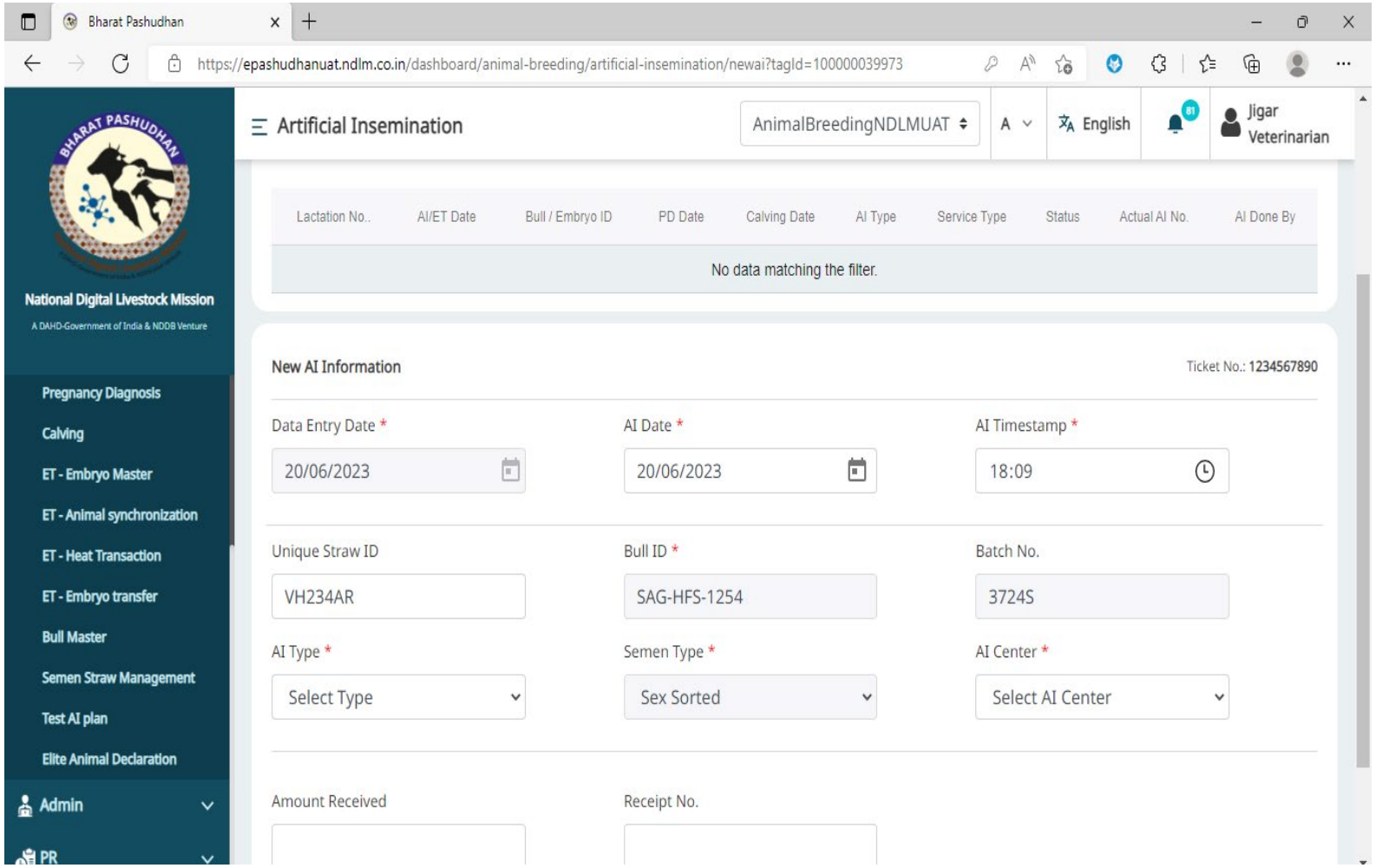
For entering details of AI following fields are required to be entered:

1. Tag ID
2. Unique Code of Semen Straw

   Or

3. Bull ID plus Batch ID
4. Date of AI

Details such as User ID, location etc. are captured by the system automatically through Login.



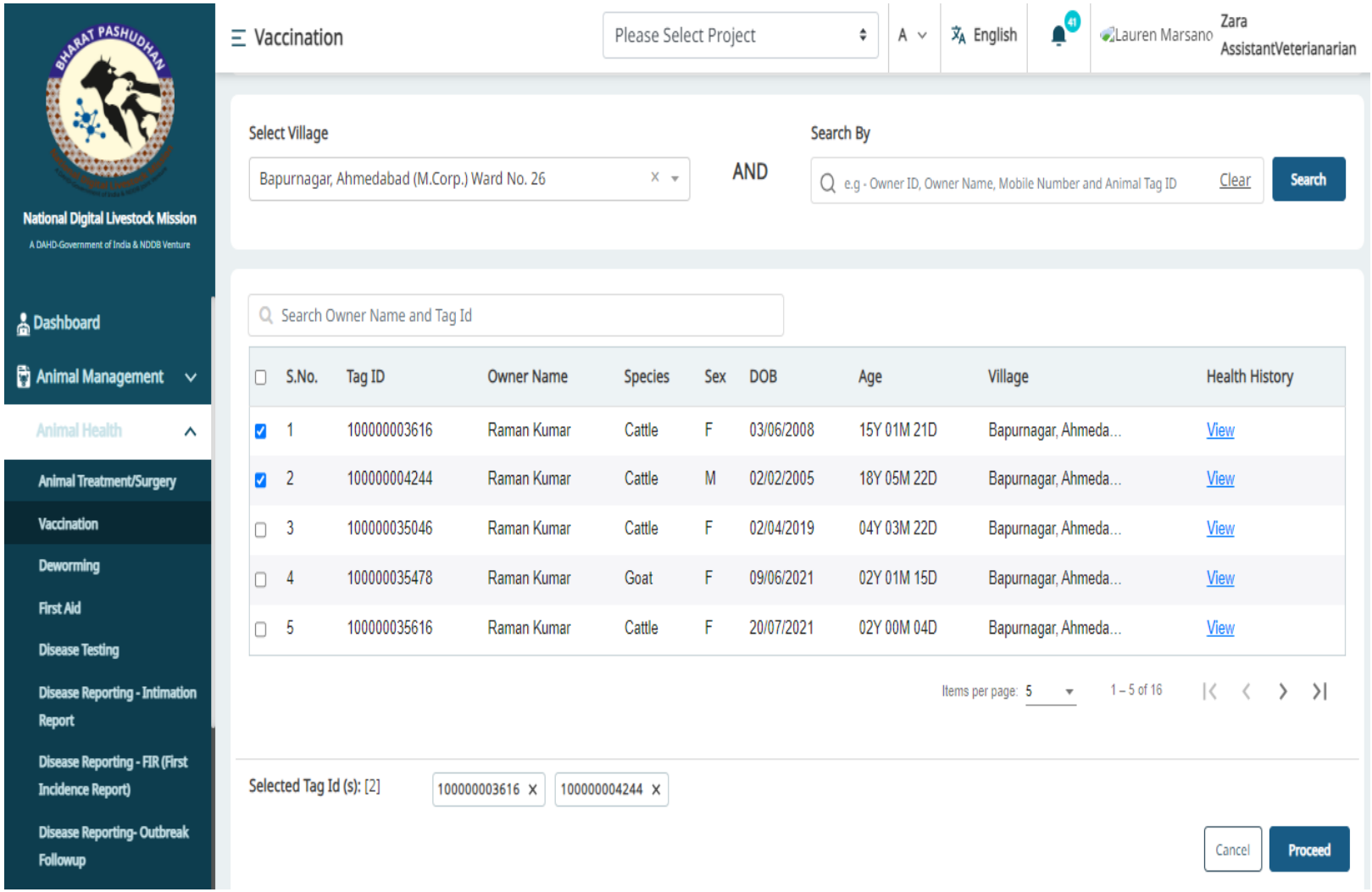
Using Tag ID for Recording Vaccination

Vaccination:

For entering details of Vaccinations following fields are required to be entered:

1. Campaign for type of vaccine
2. Village to be selected
3. Tag ID to be selected
4. Date of Vaccination

Details such as User ID, location etc. are captured by the system automaticaly through Login.



Using Tag ID for Recording Health Treatment

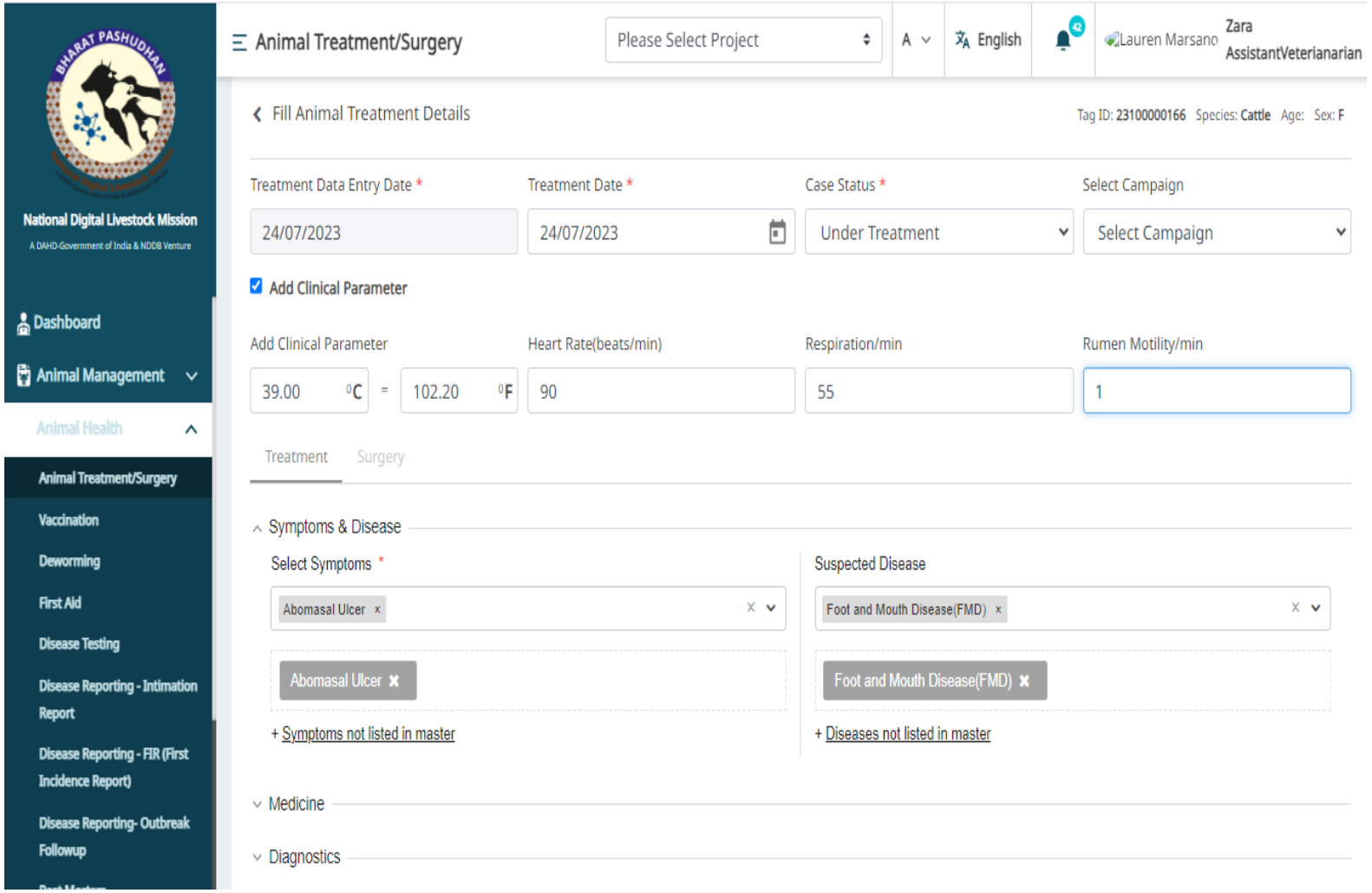
Treatment / Surgery:

For entering details of Treatment following fields are required to be entered:

1. Tag ID to be selected

2. Particulars of treatment given, medicine prescribed, surgery details, samples taken, etc. are recorded.

Details such as User ID, location etc. are captured by the system automaticaly through Login.



All transactions are captured using Tag ID only

Animal Health

- Disease Testing
- Disease Reporting – Intimation Report & FIR
- Disease Reporting – Outbreak & Follow Up
- Post-mortem Report
- Growth Monitoring & Typing
- Deworming
- First Aid

Animal Breeding

- Calving
- Pregnancy Diagnosis
- Milk Recording
- Genetic Analysis
- Bull ID Creation
- Elite Animal Declaration
- Breed Value Estimation

Animal Management

- Ear Tag Change
- Modify Owner Details
- Modify Animal Details
- Ownership Transfer

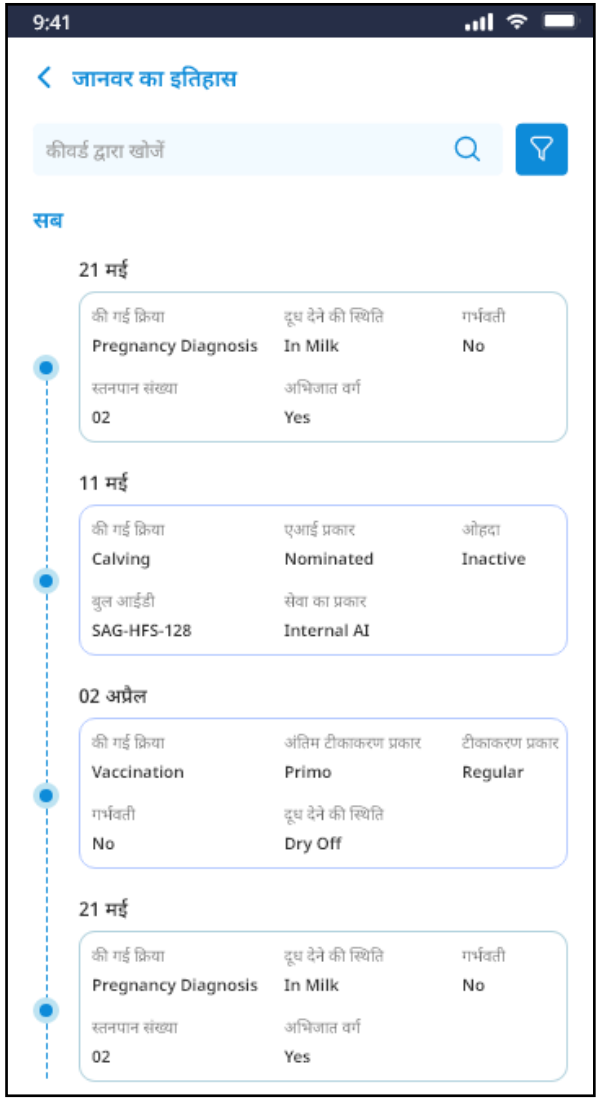
All transactions are reflected in Animal History

Animal History Report

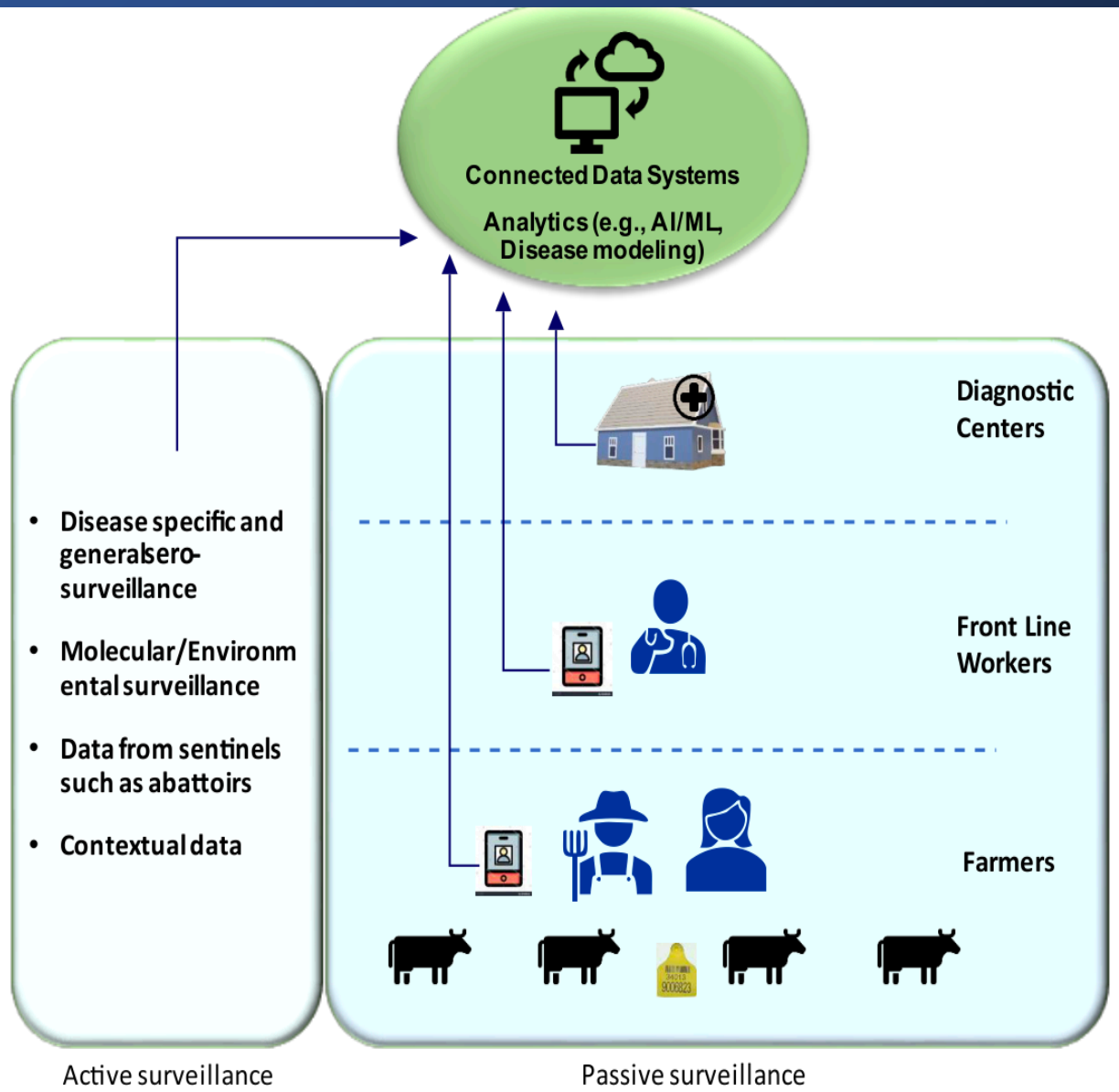
Animal Details

Tag Id	Species	Sex	Age	Date Of Birth
101593228663	Cattle	F	12Y 1M	01/09/2011

Date	Transaction	Description
23/07/2023	Artificial Insemination	{Artificial Insemination Id=50048186, Artificial Insemination Type=General, Semen Type=Conventional, Current Lactation Number=5, Tag Id=101593228663, Artificial Insemination Status=Successful, Actual Artificial Insemination Heat Number=3, Login ID=dhUdhampur, Mobile Number=9419164244}
22/07/2023	Vaccination	{Disease Desc=Foot and Mouth Disease(FMD), Vaccine Name=Raksha-Ovac, Vaccination Type=Primo/Regular, VaccineSubType=Trivalent (O,A,Asia-1), Route=Intra-muscular, VaccineBatchNo=01FUT04222, Vaccine Manufacturer=Indian Immunologicals Ltd., Vaccine CampaignId=3261, User Login Id=dhUdhampur, Mobile No=9419164244}
02/05/2023	Pregnancy Diagnosis	{Pregnancy Diagnosis Id=8419076, Current Lactation Number=5, Pregnancy Diagnosis Result=Pregnancy Failed, Service Type=Internal AI, Pregnancy Month=3, Sire Tag Id=105669692616, Bull Id=BAF-MAGADH, Login ID=dhUdhampur, Mobile Number=9419164244}
08/02/2023	Artificial Insemination	{Artificial Insemination Id=13879287, Batch Number=12/08/2020, Artificial Insemination Type=General, Semen Type=Sex Sorted, Current Lactation Number=5, Tag Id=101593228663, Artificial Insemination Status=Unsuccessful, Actual Artificial Insemination Heat Number=2, Login ID=dhUdhampur, Mobile Number=9419164244}
19/01/2023	Artificial Insemination	{Artificial Insemination Id=13814912, Batch Number=12/08/2020, Artificial Insemination Type=General, Semen Type=Sex Sorted, Current Lactation Number=5, Tag Id=101593228663, Artificial Insemination Status=Unsuccessful, Actual Artificial Insemination Heat Number=1, Login ID=dhUdhampur, Mobile Number=9419164244}
19/09/2022	Vaccination	{Vaccine Name=NA, Vaccination Type=Primo/Regular, VaccineSubType=Freeze Dried, Route=sub-cutaneous, VaccineBatchNo=NA, Vaccine Manufacturer=NA, Vaccine CampaignId=0, User Login Id=avudhdcp, Mobile No=8492951686}



Integration of NDLM application data for Disease Monitoring



Near Real-time Disease Reporting in NDLM

Multiple sources of data is integrated

- ✓ Farmers and FLWs data that is pulled automatically from the field activities
- ✓ Outbreak reporting data from diagnostic centres, etc
- ✓ Surveillance & monitoring data
- ✓ Data can be weighted and integrated with predictive analytics of NADRES.

Objectives of Integrating Disease Monitoring

- Development of centralized disease analytic hub as real- time livestock disease reporting, forecasting and alert system on NDLM platform.
- Development of outbreak investigation & response mechanism and estimation of livestock disease burden for prioritization of resource allocation for control of diseases.
- Centralized and well monitored system for pre- and post-vaccination monitoring and surveillance
- Informed decision making for resource allocation for vaccination strategies
- Availability of well-trained manpower for conducting disease investigation and outbreak response

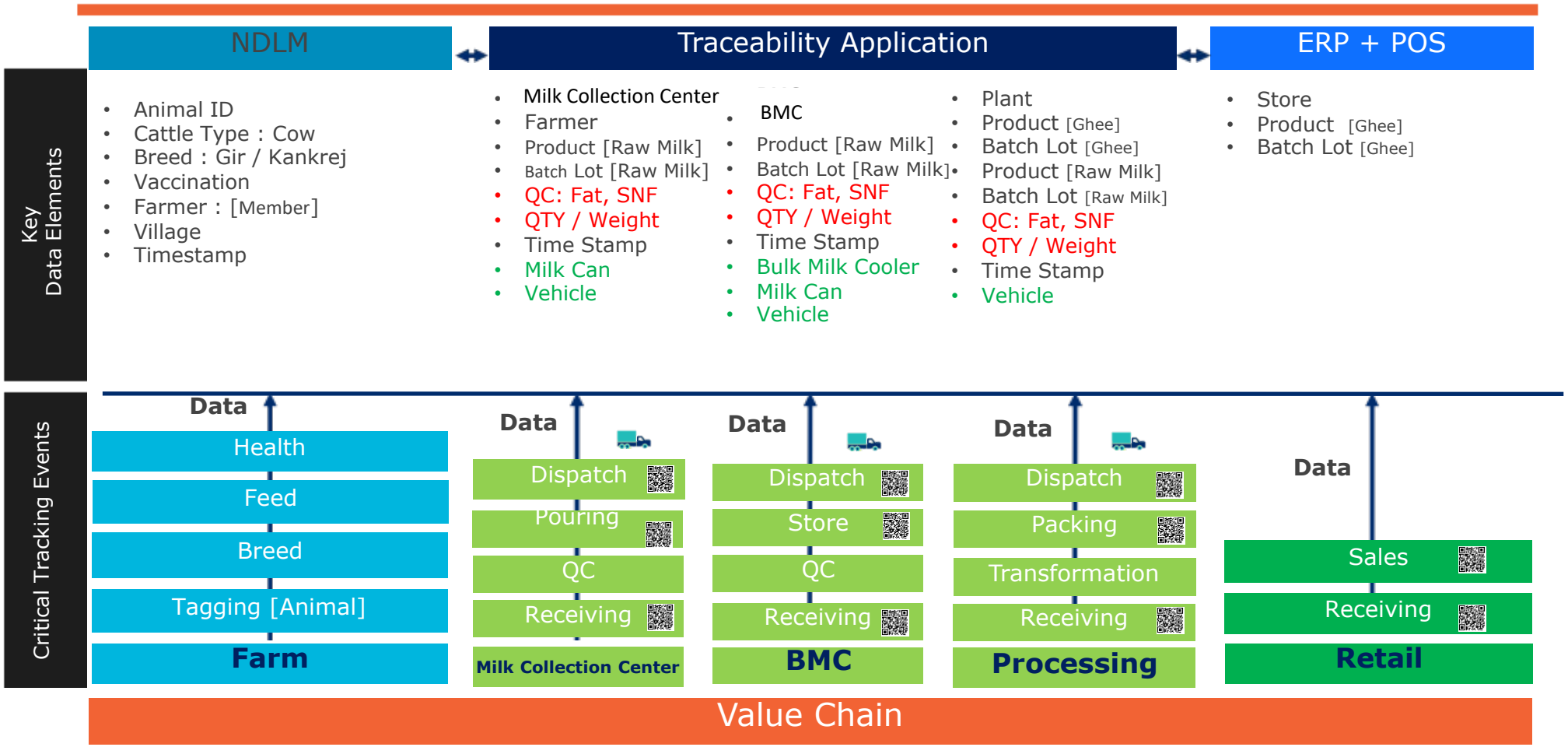
Building blocks for enabling Product traceability

Traceability data is generated through execution of various business process carried by each touchpoint in the supplychain

- **Who** : Which parties involved ?
- **What**: What primary object being traced? What related objects needs to be traced?
- **Where**: Where did the events take place?
- **When**: When did the movement or event that included that object occur?
- **Why**: What business process was happening at the time when the event took place?

Demo Value Chain for any Livestock product

Demo Functional Architecture for end to end Traceability



Overall Objectives of NDLM

1. Farmer centric Ecosystem : To empower the Farmers by providing them technological tools for fully utilizing Government facilities, schemes and avail the services required for the livestock.

2. Breed Improvement: The data integration will help in creating a breeding program for achieving the best quality germplasm that is appropriate for various agroclimatic conditions of India

3. Product Traceability: With integration of Tag-IDs, geographical locations a fool proof traceability system for livestock products is proposed to be established as a part of this ecosystem. The traceability aspect will provide opportunities for branding of products, enhancing the sales thereby resulting in increased income for the livestock farmers.

4. Disease Monitoring and Control: An integrated Disease monitoring and control system that can prevent, predict, respond and treat major diseases that affect animals and in turn human beings using latest AI/ML tools is a part of this project.

5. Open source Architecture and API enabled environment: All stakeholder groups like Financing institutions, Insurance sector, private practitioners and various start-ups working in this field will be integrated in this system through an open source architecture for an API based integration environment for seamless information exchange across the sector.


BHARAT PASHUDHAN
National Digital Livestock Mission
A DAHD, Government of India & NDDB Joint Venture

THANK YOU