

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

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• 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

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• 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 - 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



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.

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PAN Number *		Identity a	& Name		
eg. IWVPS9146A			⁻ Number 456789012		
Mobile Number *		69.125	150705012		
eg. 9876543210		Mobile N	Number *		
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Registration of Animals using 12 Digit Tag ID

Unique Animal Identification (UAID)







Technical Specifications of Tag ID

ir. Io.	Description		
	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		1
	female piece should be comprised between 55 x 65 mm and 58 x 69 mm with a closed head.		
2	 <u>Raw Material</u>: 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. 	70)
	 The manufacturer should provide documentation from the independent and 	1	in 11 11 11
	recognized sources to demonstrate the non-resolvability of its tags. Pull test certificate	at at a	
	for the ear tag with minimum 28KgF pull test force shall be furnished at the time of		60
	submitting technical bid.		00
	Weight: The weight of the ear tag (male+female) should be 7 grams (+/- 10%).	1-200 7	09
	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).	· Filtred	
	Numbers and bar code should be covering full size of the female tag and leaving 2 mm margin on all sides.	Ser multis (iii	3
	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.	840 ON	56 780
_	Colour : The colour of the tag should be lemon yellow	3 123	x.
	Packing : In order to manage the tag inventory the eartag should be packed in batches of	125	
	100 pieces in a good quality polyethylene bags indicating beginning and ending numbers and		00
	further packed in a corrugated box containing 500 pieces of ear tags i.e. 5		N
	polyethylene bags each containing 100 pieces of ear tags.		0
	Ear Tag Applicator: Compatible Universal applicator with 1 extra pin along with the ear		0
0	tags should also be supplied.		12
0	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	L	
	(Raw Material)		

Procedure for 12 Digit Codes Generation centrally by NDDB



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.

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User ID : UTT384	622549	27/10 1	1:55am V1.19)	User ID : U	Т
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Fill the form					Fill the f	orn
Ear Tag Numbe	er*]	Select	
eg. 123456789	0012		Ξ		Name of	Ani
Data Entry Date	e* Ta	agging Dat	te *		eg. abc	
27/10/2023	2	27/10/2023	\$		Date Of I	Birth
Species *					DD/MM	/YYYY
Select						
Name of Anima	al So	ex *			Image of Farmer, s	
eg. abc	S	elect Sex			0	Click Pl
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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 registered 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 Al 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.

 Bharat Pashudhan ← → C	× +	g/artificial-insemination/newai?tagId=100000039973		- 0 ×
SURPAT PASHUDHIN	\equiv Artificial Insemination	AnimalBreedingNDLN	MUAT 🗢 A 🗸 🛪 English 📭	Jigar Veterinarian
	Lactation No AI/ET Date Bull / Emb	ryo ID PD Date Calving Date AI Type	Service Type Status Actual Al No.	Al Done By
		No data matching the filter.		
National Digital Livestock Mission				
A DAHD-Government of India & NDDB Venture Pregnancy Diagnosis	New AI Information		Tick	ket No.: 1234567890
Calving	Data Entry Date *	AI Date *	AI Timestamp *	
ET - Embryo Master	20/06/2023	20/06/2023	18:09	9
ET - Animal synchronization				
ET - Heat Transaction	Unique Straw ID	Bull ID *	Batch No.	
ET - Embryo transfer	VH234AR	SAG-HFS-1254	37245	
Bull Master	AI Type *	Semen Type *	AI Center *	
Semen Straw Management	Select Type	Sex Sorted	Select AI Center	•
Test AI plan	Select Type	Sex Sorred	Select At Center	
Elite Animal Declaration				
🛔 Admin 🛛 🗸 🗸	Amount Received	Receipt No.		
k∰ PR ∨				

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.

SHERT PASHUDHPL	ΞV	accinatio	n		Please Selec	t Proje	ect	\$	Α ~	ネ English	.∎	≪Lauren Marsano	Zara Assistant	tVeterianarian
National Digital Livestock Mission		l ect Village Bapurnagar,	Ahmedabad (M.Corp.) V	Vard No. 26	Χ 🔻	ļ	ND	Search By	ner ID, Ow	ner Name, Mol	oile Number a	nd Animal Tag ID	<u>Clear</u>	Search
🔓 Dashboard	C)、Search C)wner Name and Tag Id											
🚏 Animal Management 🛛 🗸		S.No.	Tag ID	Owner Name	Species	Sex	DOB	Age		Villag	je		Health Hist	tory
Animal Health 🔨		1	10000003616	Raman Kumar	Cattle	F	03/06/2008	8 15Y	01M 21D	Вари	rnagar, Ahm	eda	<u>/iew</u>	
Animal Treatment/Surgery		2	10000004244	Raman Kumar	Cattle	М	02/02/2008	5 18Y	05M 22D	Bapu	rnagar, Ahm	eda	<u>/iew</u>	
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Deworming		4	10000035478	Raman Kumar	Goat	F	09/06/2021	1 02Y	01M 15D	Вари	rnagar, Ahm	eda	<u>/iew</u>	
First Aid Disease Testing	0	5	10000035616	Raman Kumar	Cattle	F	20/07/2021	1 02Y	00M 04D	Bapu	rnagar, Ahm	eda	<u>/iew</u>	
Disease Reporting - Intimation Report	1									Items per page:	5 👻	1 – 5 of 16	< <	> >
Disease Reporting - FIR (First Incidence Report)	Sel	ected Tag I	d (s): [2]	1003616 ×	004244 ×									
Disease Reporting- Outbreak Followup													Cancel	Proceed

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.

STARAT PASHUDHP	Ξ Animal Treatment/Surgery	Please Select	t Project	\$	A v	ネ English	≜ ²	Zara Karsano AssistantVeterianarian
	Fill Animal Treatment Details						Та	g ID: 23100000166 Species: Cattle Age: Sex: F
Contraction of the second	Treatment Data Entry Date *	Treatment Date *		Case Status *			S	elect Campaign
ional Digital Livestock Mission	24/07/2023	24/07/2023	Ē	Under Tre	atment		•	Select Campaign 🗸 🗸
	Add Clinical Parameter							
ashboard	Add Clinical Parameter	Heart Rate(beats/min)		Respiration/m	in		R	umen Motility/min
nimal Management 🗸 🗸 🗸 🗸	39.00 °C = 102.20 °F	90		55				1
nimal Health 🔹	Treatment Surgery							
nimal Treatment/Surgery	Treatment Surgery							
/accination	Symptoms & Disease							
Deworming	Select Symptoms *			Suspected D	isease			
irst Aid	Abomasal Ulcer ×		× •	Foot and Mo	outh Disea	se(FMD) ×		× ¥
Disease Testing								
Disease Reporting - Intimation	Abomasal Ulcer 🗙			Foot and	Mouth Di	sease(FMD) 🗙		
Report	+ <u>Symptoms not listed in master</u>			+ <u>Diseases n</u>	ot listed i	n master		
Disease Reporting - FIR (First ncidence Report)								
Disease Reporting- Outbreak	✓ Medicine							
ollowup	 Diagnostics 							

All transactions are captured using Tag ID only

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

Animal Breedir	lg					
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	Transactio	n	Desci	iption		
23/07/2023	Artificial Insemi	nation	[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 He Number=3, Login ID=dhUdhampur, Mobile Number=9419164244}			
22/07/2023	Vaccinatio	n	Vaccine Name=Raks Type=Primo/Regular, Va (O,A,Asia-1), Rou VaccineBatchNo=01 Manufacturer=Indian Imm CampaignId=3261, Use	d Mouth Disease(FMD), ha-Ovac, Vaccination cicrineSubType=Trivalent te=Intra-muscular, FUT04222, Vaccine unologicals Ltd., Vaccine r Login Id=dhUdhampur, i419164244}		
02/05/2023	Pregnancy Dia	gnosis	{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 Insemi	nation	Number=12/08/2020, Type=General, Semen T Lactation Number=5, Tag I Insemination Status=Uns Insemination Heat Number	d=101593228663, Artifici uccessful, Actual Artificial		
19/01/2023	Artificial Insemi	nation	{Artificial Insemination Id=13814912, Batch Number=12/08/2020, Artificial Insemination Type=General, Semen Type=Sex Sorted, Currer Lactation Number=5, Tag Id=101593228663, Artifi Insemination Status=Unsuccessful, Actual Artifici Insemination Heat Number=1, Login ID=dhUdham Mobile Number=9419164244}			
19/09/2022	Vaccinatio	n	Type=Primo/Regular, Vacc Route=sub-cutaneous, Vac Manufacturer=NA, Vacc			

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21 मई			
की गई क्रिया		दूध देने की स्थिति	गर्भवती
Pregnancy	Diagnosis	In Milk	No
स्तनपान संख्य	т	अभिजात वर्ग	
02		Yes	
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की गई क्रिया		एआई प्रकार	ओहदा
Calving		Nominated	Inactive
बुल आईडी		सेवा का प्रकार	
SAG-HFS-1	28	Internal AI	
02 अप्रैल			
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No		Dry Off	
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की गई क्रिया		दूध देने की स्थिति	गर्भवती
Pregnancy	Diagnosis	In Milk	No
स्तनपान संख्य	T	अभिजात वर्ग	
201411 204			

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

	NDLM	🔹 Tra	aceability Application	*	ERP + POS
Key Data Elements	 Animal ID Cattle Type : Cow Breed : Gir / Kankrej Vaccination Farmer : [Member] Village Timestamp 	 Milk Collection Cente Farmer Product [Raw Milk] Batch Lot [Raw Milk] QC: Fat, SNF QTY / Weight Time Stamp Milk Can Vehicle 	 BMC Product [Raw Milk] Batch Lot [Raw Milk] Produ QC: Fat, SNF QTY / Weight QC: F Time Stamp QTY / 	Ict [Ghee] • Pr Lot [Ghee] • Ba Ict [Raw Milk] Lot [Raw Milk] Fat, SNF ' Weight Stamp	core roduct [Ghee] atch Lot [Ghee]
Events	Data 🛉 Health	Data 🗍 🔜	Data Dat	a 🕇 🔜	1
ting Eve	Feed	Dispatch 📰 Pouring	∎7249	Dispatch 📷 Packing	Data
Critical Tracking	Breed	QC		sformation	Sales 🧱
ritical	Tagging [Animal]	Receiving	Receiving 🎆 🛛 Re	eceiving	Receiving
Ū	Farm	Milk Collection Center	BMC Pro	ocessing	Retail
			Value Chain		

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.



THANK YOU