Integrated Multipurpose Animal Recording Systems in India - INAPH

Kamlesh Trivedi

Progress of INAPH

- Information Network for Animal Productivity and Health (INAPH) was developed and pilot-tested during 2006-08.

- Deployed in field in April 2008 in one district for monitoring a progeny testing programme

- At present , INAPH application is used across the country for many purposes (As on : 26-09-2021)

1	No. of states	36
2	No. of districts	709
3	No. of villages	515,013
4	No. animals registered	180,103,350
5	No. of projects	303
6	No. of users	398,747
7	No. of AI entered	49,233,272
8	No. of calving recorded	6,713,671
9	No. of test-day records	4,739,215

- Index - INAPH (nddb.coop)
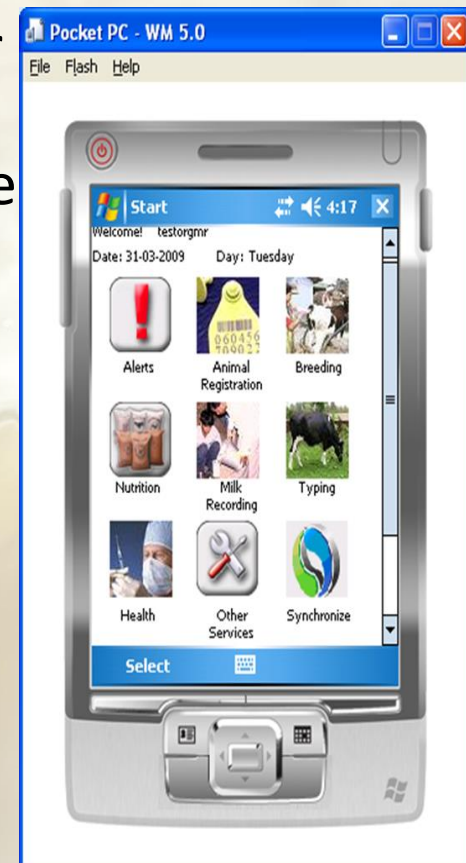
Contents

- Objectives
- Overview of the INAPH Application:
  - Hardware –Tools, Technology, and Platforms
  - Software:
    - Different modules
    - Reports - Operational Reports, Review Report , MIS Reports, Analytical reports, etc.
    - Implementation Support

- How the application is used for Animal Identification and Registration, Breeding, Nutrition, and Healthcare services

- INAPH Progress

Objectives

	Provide IT infrastructure to agencies extending productivity enhancement services
	Identify animals uniquely
	Record all events in productivity enhancement area
	Monitor field activity
	Make available relevant information online
	Provide decision support system.
	Create National Level Database
	Data Analytics

Overview of INAPH Application

INAPH at a glance

Central server

NDDB
- Administration
- Analytical reports
- BV Estimation
- SMS Delivery

Organisation

Internet

C E O

AI Delivery	Progeny Testing	Nutrition	Veterinary	Laboratories

Desktops

Regional Manager	Regional Manager	Regional Manager	Regional Manager	Milk Component Testing Lab

Communi-Cation Media

Supervisors	Supervisors	Supervisors	Supervisors	Nutrition Lab.
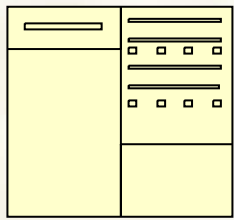
Synchronisation GSM/GPRS

Smart Phone

I & R	AI Technicians	Milk Recorders	Resource Persons	Veterinarians	Disease Diag. Lab.

1. Data entry
2. Data validation
3. Updation
4. Local output
5. Synchronization

I & R
- Registration
- Movement
- Re-Registration
- Ear tag Change

AI Technicians
- AI
- PD
- Calving
- Other Services

Milk Recorders
- Yield measurement
- Sample Collection
- Typing
- Growth Monitoring

Resource Persons
- RB Individual Animal
- RB Group of Animals
- Feed &Fodder sample collection

Veterinarians
- Treatment
- Diagnosis
- Testing
- Outbreak
- Other services

SMS – Alert Messages

Mobile

Farmer with animals in a village

Tools and Technology

- Client Server Technology
- Tools:
  - Microsoft .NET Technology
  - I Notify sync middleware for Sync process
  - SMS Engine
  - SSRS for Analytical Reports
  - Android JDK 7.0
  - Crystal Report
- Servers:
  - Database Server: MS SQL Server 2012
  - Application Server: IIS Server 8.0
- Security
  - Firewall
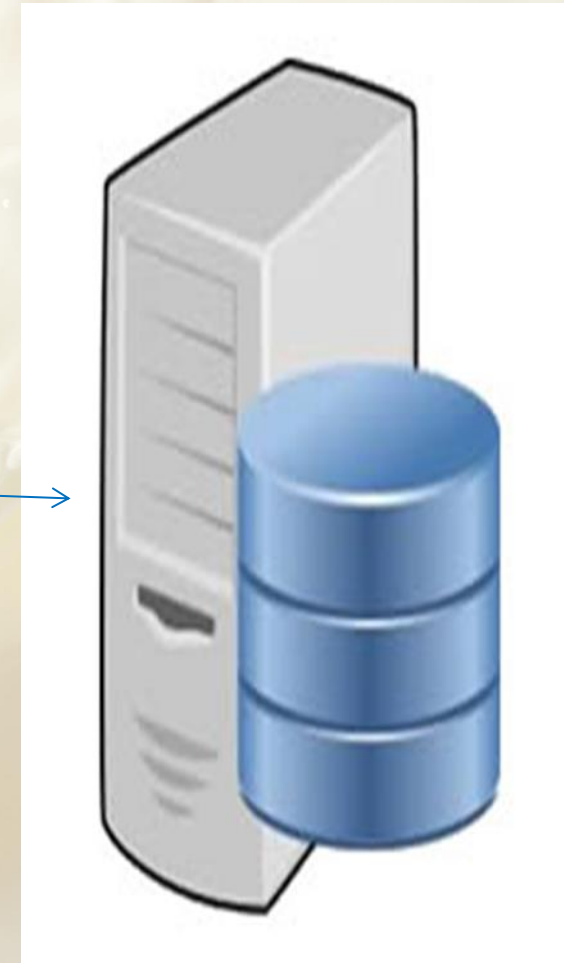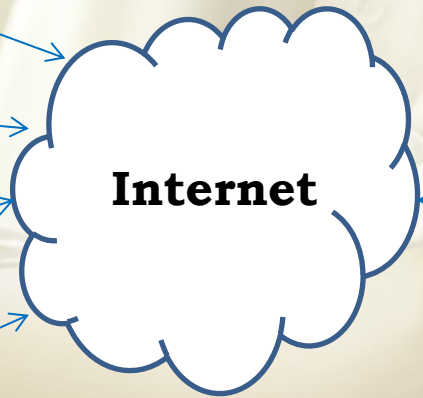
Hardware and different platforms

Clients
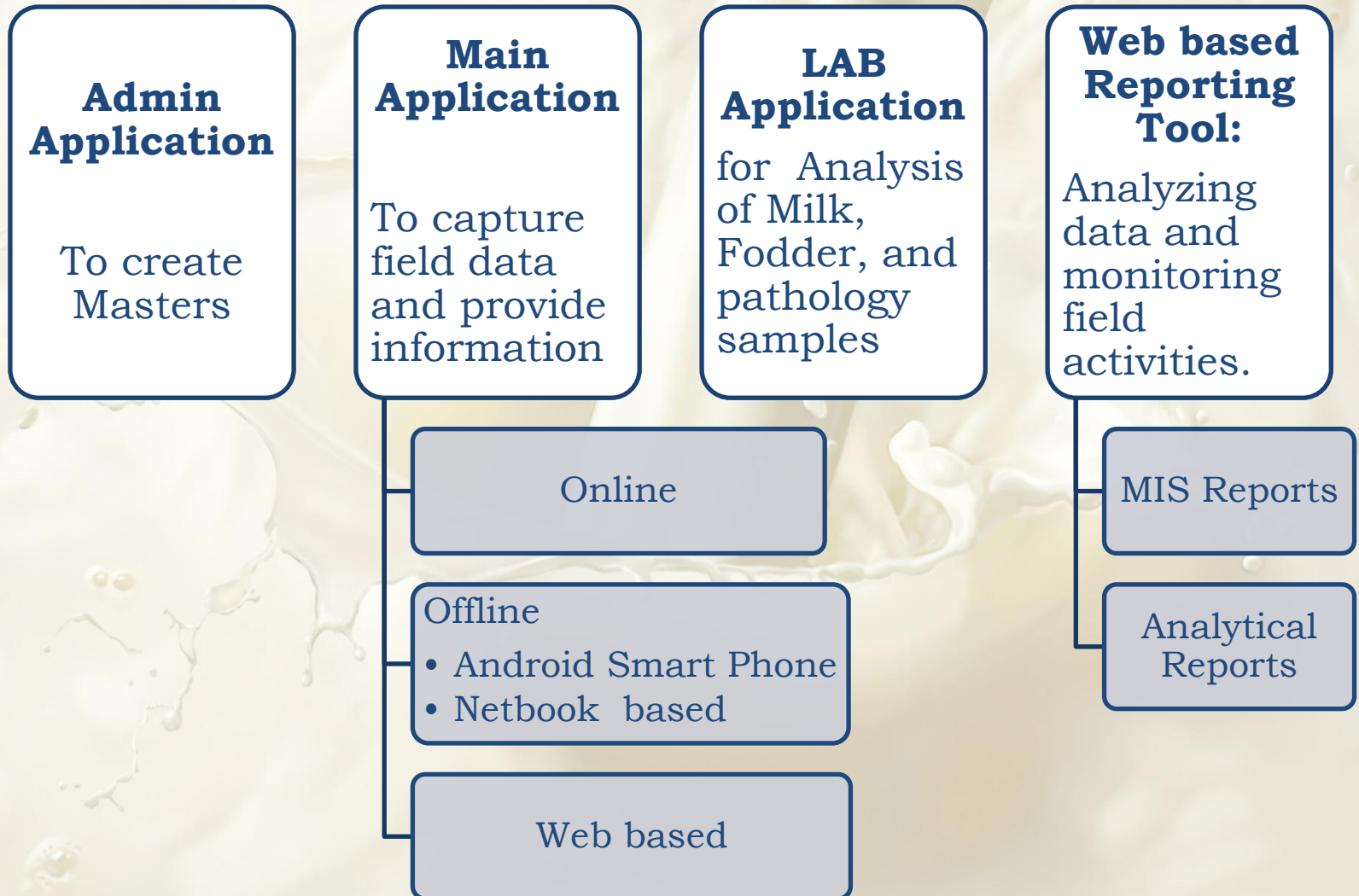
Servers

Smartphone

Tablet

Desktop

Internet

Netbook

INAPH is a bunch of Applications

Admin Application

To create Masters

Main Application

To capture field data and provide information

LAB Application

for Analysis of Milk, Fodder, and pathology samples

Web based Reporting Tool:

Analyzing data and monitoring field activities.

Online

Offline
• Android Smart Phone
• Netbook based

Web based

MIS Reports

Analytical Reports

Admin Application

NDDB - Information Network for Animal Productivity and Health

Information Network For Animal Productivity And Health

Welcome! rtvasava   Today's Date: 25-06-2014   Day: Wednesday   ↻ Logout   ⏻ Exit

Generic Modules

Organization

Agency

Village Institution

AI centre

User Profile Management

Access Privilege

Item master

Item Transaction

Laboratory

General AI To Test AI

General AI To Nominated AI

Animal Deletion

User Synchronized List

SMS Regulation

User Synchronisation Report

Org wise hierarchy

SMS Settings

SMS Report

EPM INAPH Integration

Domain Specific Modules

Breeding

Semen Station

Bull master

Test Dose Distribution Plan

Genetic Defects

Breeding Value Estimation

Breeding Value Updation

Milk Component Analysis Range

Growth Monitoring Master

Nutrition

Feed Anaysis and Test Mapping

Feed Sub class

Main Feed Liabrary

District Feed liabrary

Maintenance Requirement

Milk Production

Preganancy Requirement

Growth Requirement

Dry Matter Requirement Range

Concentrate Forrage Ratio

Health

Disease

Examination type

Assign Frequency

Vaccination

Pathology sample type list

Medicine Route Master

Medicine

Symptom

Action Taken

Infection Source

Medicine Form Master

Targets

Target Parameter Creation

Target Parameter Recording
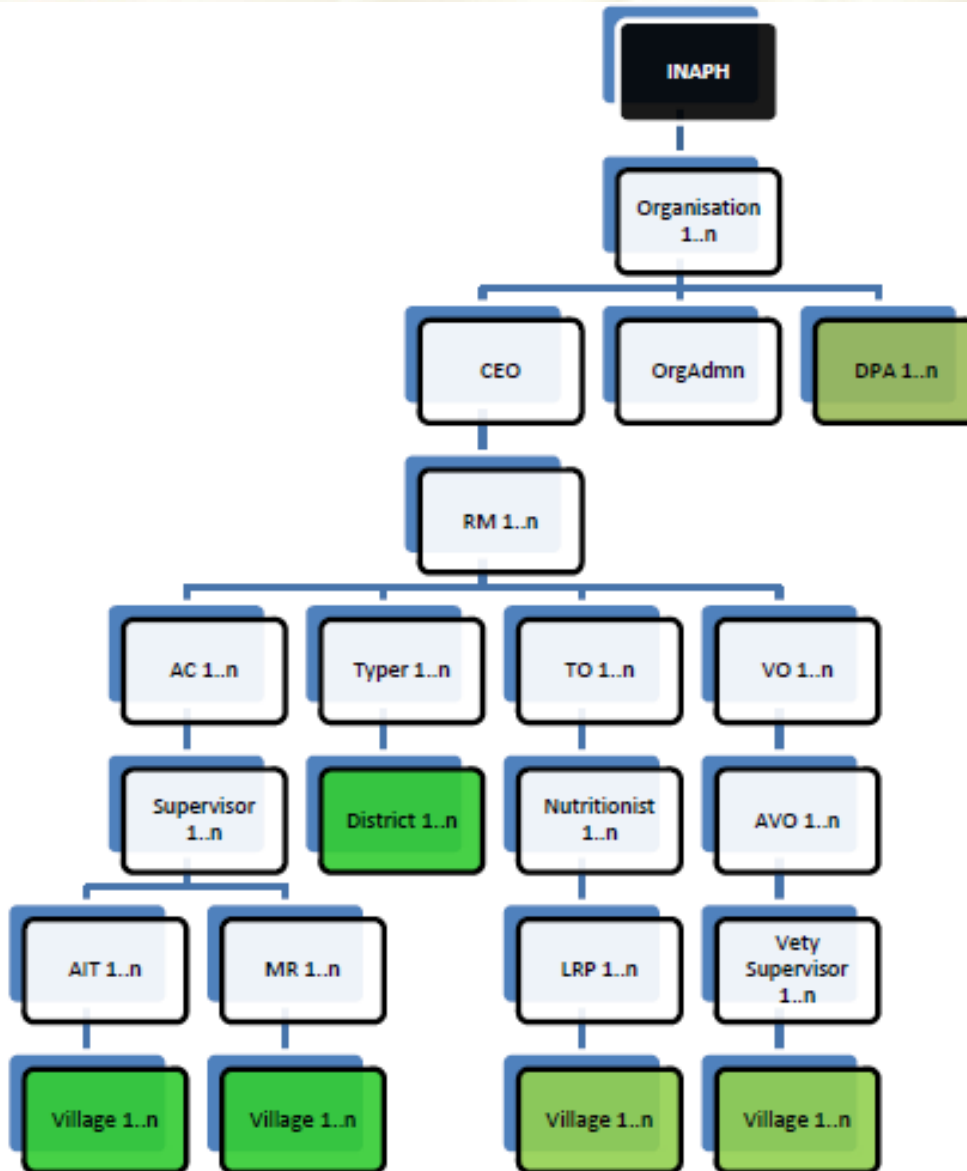
29-09-2021

Location/Geographical Hierarchy

As per GOI, 2011 census.	
State	28 +8
District	718
Taluka	6,072
Rev Village	**6,40,867**
Hamlet	1,693,646

29-09-2021

Access Hierarchy

- Five Level of Access Hierarchy

- Multiple villages to one Field Users.

- Same Village can be assigned to multiple Field Users.

- **Role** (AI tech, LRP, Milk Recorder, Health worker, Analyst, etc.) and **Hierarchy** Based **Access Control** .

- **Organization level** administration managed at local organizational level through Admin Application.

Main App for Android Smartphone Users

Animal Identification Registration

	Animal Registration
	Owner Registration
	Animal Movement (Sale, Cull, Death)
	Ear Tag Change
	Animal Re-registration
	Animal Management Query
	Animal Health Card
	Reports

Nutrition

	District Feed Library
	Individual Animal
	RB-CRP
	Herd
	Nutrition Masters View
	Feed Sample

Synchronize

Breeding

	Artificial Insemination (AI)
	Pregnancy Diagnosis (PD)
	Calving
	Forced Pregnancy Termination
	Reports

Milk Recording

	Morning Milk Recording/Dry Off
	Noon Evening Milk Recording
	Mass Dry Off
	Growth Monitoring
	Elite Animal Identification
	Parentage Verification
	Male Calf Procurement
	Typing
	Reports

Synchronize

	Typing
	Reports

Health

	Individual Services
	Vaccination
	De-worming
	Fertility Issues
	Disease Testing
	Animal Treatment
	Followup Treatment
	Group Services
	Mass Vaccination
	Mass De-worming
	Village Infertility Camps
	Group Disease Testing
	Treatment Camp
	Reports

Synchronize

Main App for Netbook, Laptop and Desktop Users

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help   Exit

Animal Registration

Welcome! aboait1   Today's Date: 08-01-2010   Day: Friday

Fields Marked with * are Mandatory

Animal Registration

Animal Details

*Tag Number: 190000014113

*Animal Movement: ○ Yes   ● No

*Species: ● Cattle   ○ Buffalo

*Breed: HF   [Get Breed]

*Registration Date: 01-04-2007

*Age(Year and Months):   4   -   0

Date of Birth: 01-04-2003

Exotic Blood Level: HF 100.00

Sire ID:
Dam ID:
Sire's Sire ID:
Dam's Sire ID:
Number of Calving:
Last Calving Date: [Reset]

*Pregnant: ○ Yes   ● No
*Pregnancy Months:
*Milking Status: ○ In Milk   ● Dry
*Animal's Organization: ANIMAL BREEDING ORGANIS...
Parentage Error: ☐

Owner Details

*Village: ACHHOD

*Owner: ● New Owner   ○ Existing Owner

*Owner's Name along with Father's Name: RAGHUPATI

Date of Birth: 01-01-1969   [Reset]

Affliated Agency:

Village Institution:
Farmer Association No: 123456
Below Poverty Line: ☐ Yes
Mobile Number: 09427382760
Landline Number:

Previous Owner Details

Name: Laxman
State: GUJARAT
District: Panch Mahals
Taluka: GODHRA
Village: DHANOL
Remarks:
Price: 15000

Location Details

Hamlet: Limdawala
*Tehsil: AMOD
*District: Bharuch
*State: GUJARAT

[Register]   [Reset]

Activity Recording & Validation Checks

- 12 ~~Di~~
- Valid R~~e~~
  ~~C~~

- Match of Spe~~cies~~
  Bull/Sem~~en~~

- Animal in th~~e~~
  Area of O~~perations~~

- What Service???
  - Why???
  - When???

Ear Tag #	Unique Tag #	Species	Gender	Geography	Animal Status	Transaction Eligibility	Logical Sequence

- Not Regist~~ered~~
- Not Replace~~d / ~~
  Change~~d~~

- Gender Spe~~cific~~
  Activity~~s~~

- Order of Recording an
  Activity

Information Generation
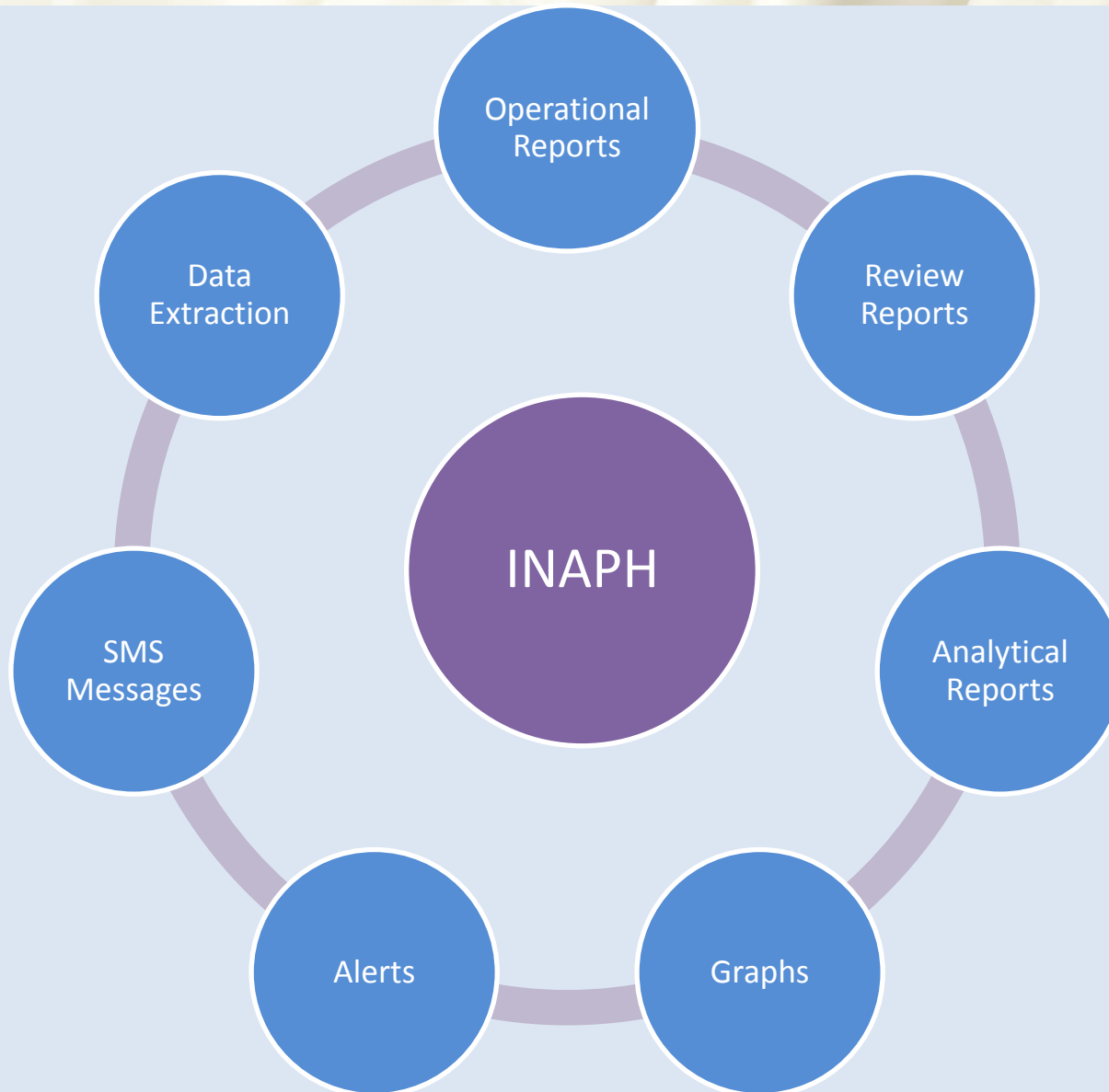
Field Implementation Support

- **NDDB Level**
  - ➤ Software Development, Maintenance, Enhancement
  - ➤ Training to Trainers
  - ➤ Training for Analytics
  - ➤ Troubleshooting

- **User Agency**
  - ➤ Training to field users
  - ➤ First hand troubleshooting
  - ➤ Data Capturing
  - ➤ Field Testing

INAPH –
An Integrated Multi-purpose System

Animal Identification and Registration

Mehsana Buffalo being
ear tagged

Identification and Registration of Animals

- Animals are identified by 12 digit unique ear tag numbers:

  - First 11 digits of Ear tag number are running serial numbers.

  - 12th digit is check digit

- Ear tags' number are provided by NDDB ensuring uniqueness of number across country.

Unique Bull / Semen Identification

12 digit unique ID

060456
709022

SS unique Bull ID

SAG-HFSH-1340

Printing on Semen Straw

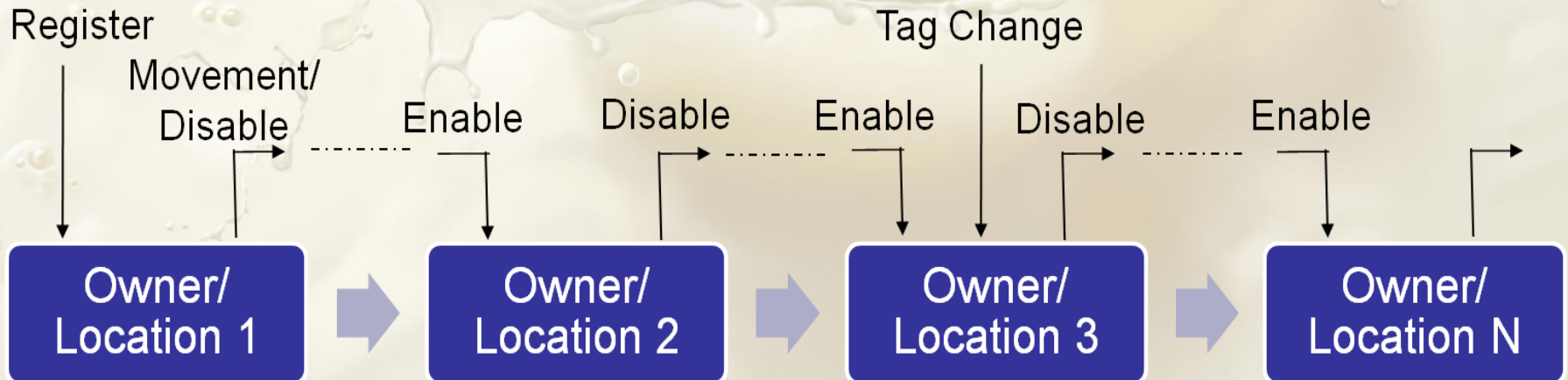XXX XXXX XXX xxxxx

Bull ID

Breed of bull

SS Code

Batch No.

Animal Identification & Registration

Animal Registration

Movement (Sale, Death, Cull etc)

Re-Registration (Enable)

Ear tag Change

Register

Movement/
Disable

Tag Change

Enable

Disable

Enable

Disable

Enable

Owner/
Location 1

Owner/
Location 2

Owner/
Location 3

Owner/
Location N

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help   Exit

Animal Registration   **Welcome!** aboait1   **Today's Date:** 08-01-2010   **Day:** Friday

Fields Marked with * are Mandatory

Animal Registration

Animal Details

Field	Value
*Tag Number:	190000014113
*Animal Movement:	○ Yes ● No
*Species:	● Cattle ○ Buffalo
*Breed:	HF [Get Breed]
*Registration Date:	01-04-2007
*Age(Year and Months):	4 - 0
Date of Birth:	01-04-2003
Exotic Blood Level:	HF 100.00

Field	Value
Sire ID:	
Dam ID:	
Sire's Sire ID:	
Dam's Sire ID:	
Number of Calving:	
Last Calving Date:	[Reset]
*Pregnant:	○ Yes ● No
*Pregnancy Months:	
*Milking Status:	○ In Milk ● Dry
*Animal's Organization:	ANIMAL BREEDING ORGANIS
Parentage Error:	☐

Owner Details

Field	Value
*Village:	ACHHOD
*Owner:	● New Owner ○ Existing Owner
*Owner's Name along with Father's Name:	RAGHUPATI
Date of Birth:	01-01-1969 [Reset]
Affliated Agency:	
Village Institution:	
Farmer Association No	123456
Below Poverty Line:	☐ Yes
Mobile Number	09427382760
Landline Number	

Location Details

Field	Value
Hamlet:	Limdawala
*Tehsil:	AMOD
*District	Bharuch
*State	GUJARAT

Previous Owner Details

Field	Value
Name	Laxman
State	GUJARAT
District	Panch Mahals
Taluka	GODHRA
Village	DHANOL
Remarks:	
Price:	15000

[Register]   [Reset]

Inbox - ...   INAPH 1...   220.225....   NDDB - I...   INAPH ...   12:30 PM

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help   Exit

Other Services>Animal Movement   **Welcome!** aboait1   **Today's Date:** 09-01-2010   **Day:** Saturday

Fields Marked with * are Mandatory

Animal Movement

*Tag Number:	190000014124	*Movement Date:	01-08-2009
*Movement Type:	Sold	Amount:	10000

From Owner Details

*Owner Name:	RAGHUPATI
*State:	GUJARAT
*District:	Bharuch
*Taluka:	AMOD
*Village:	ACHHOD

To Owner Details

*Owner Name:	jagmoha
*State:	GUJARAT
*District:	Anand *
*Taluka:	ANKLAV
*Village:	SANKHYAD
Remarks:	heifer

☐ Do You Want to Move the Animal To Semen Station?

Save   Reset

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help   Exit

Other Services>Change Ear Tag   **Welcome!** aboait1   **Today's Date:** 09-01-2010   **Day:** Saturday

Fields Marked with * are Mandatory

Change Ear Tag

*Old Tag Number: `190000014124`   Forgot Old Tag Number?

*New Tag Number: `_____`

*Transaction Date: `09-01-2010`

[Save]   [Reset]

Search Ear Tag

*Village: `[ ▼ ]`

*Owner   `_____`

Owner Birth Date: `09-01-2010`   [Search]

Farmer Association No: `_____`

Search Results

	Animal ID	Species	Sex

Breeding Services

Breeding Services

Capturing Animal & Owner Registration data

Capturing Artificial Insemination data

Capturing result of Pregnancy Diagnosis

Recording Calving Details

Capturing Male Calf Registration

Capturing Daughter Registration

Capturing Milk Recording data

Alerts

Messages

Reports

29-09-2021
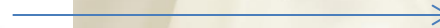
AI service at farmer's door step

Every inseminated animal is to be identified by an ear-tag having unique number

Semen from A or B grade semen station and of certified bull only used

Record all data of AI, PD and calving on an individual animal basis through INAPH

Breeding Module

Artificial Insemination (AI)

Pregnancy Diagnosis (PD)

Calving

Breeding Module - Insemination Types

Test Insemination
- Test Bull ID
- Test Village
- Test Period (From ,To)

Nominated AI
- Nominated Bull
- Nominated AI

General AI
- Neither Nominated nor Test

Breeding Module - Inbreeding Validation Mechanism

Mechanism inbuilt in the AI functionality.

System keeps track of Sire, Sires's Sire & Dam's Sire for each animal.

To check inbreeding, these sires are popped up at the time of AI.

Mechanism can be best used when transactions are recorded at cow site.

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Breeding>Artificial Insemination   **Welcome!** aboait1   **Today's Date:** 08-01-2010   **Day:** Friday

Fields Marked with * are Mandatory

Artificial Insemination

Check On Tag Number

*Tag Number :   190000014113

Species

Species: Cattle

Related Animal Details for Last Insemination

Last Insemination Date:

Last Bull/Semen Number:

Current Lactation Number: 1

Actual Artificial Insemination: 0

Fill Artificial Insemination Details

*Date of Insemination: 01-04-2007

Time of Insemination(hh:mm):   hh 12 : 31 mm PM

*Semen/Bull Number: MEH-HF-1   Cattle

Semen Batch Number(###-##):   123-06

Number of Wasted Semen Doses:

Type of Call: Mobile

Nominated AI: ☐ Yes

Amount to be paid: 60

Reciept Number: 1231

Save   Reset

Measurement of monthly Milk Yields

Measurement by jars   Electronic Weighing Machine for Milk Recording

Measurement of milk components

Centralized - Milkoscan

Decentralized Lactoscan

NDDB - Information Network for Animal Productivity and Health

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help   Exit

Milk Recording>Milk Recording and Genetic Evaluation>Create a Milk Record   **Welcome!** rationmr   **Today's Date:** 17-12-2008 **Day:** Wednesday

Fields Marked with * are Mandatory

Create a Milk Record

Check On Tag number

*Tag Number: [   ]   [🔍]

Last Milk Recording Details

Calving Date: [ ]	Milk Recording Date: [ ]	Morning Milk Production (Lit): [ ]
		AfterNoon Milk Production (Lit): [ ]
Lactation Number: [ ]	Recording Number: [ ]	Evening Milk Production (Lit): [ ]

Milk Recording Details

*Status: (•) Milking   ( ) Dry Off   *Recording Period: [Morning   ▼]

*Date of Milk Recording: [17-12-2008 ▼]   *Milk Volume (Lit): [   ]   [ ] Kg

Milk Sample Details

Sample Box Number: [   ]   Testing Charge(Rs): [   ]

Sample Bottle Number: [   ]   Receipt No: [   ]

Testing Laboratory: [▼]

Questions

Generic:

			Vaccination Given:		
Suckling:	( ) Yes	( ) No	BQ:	( ) Yes	( ) No
Sub-Clinical Mastitis:	( ) Yes	( ) No	HS:	( ) Yes	( ) No
Hoof Problem:	( ) Yes	( ) No	FMD:	( ) Yes	( ) No
De-Wormed:	( ) Yes	( ) No	Anthrax:	( ) Yes	( ) No
Feeding Mineral Mixture:	( ) Yes	( ) No	Brucella:	( ) Yes	( ) No
Calf Alive:	( ) Yes	( ) No	Theileria:	( ) Yes	( ) No

[Save]   [Reset]

start

Reports

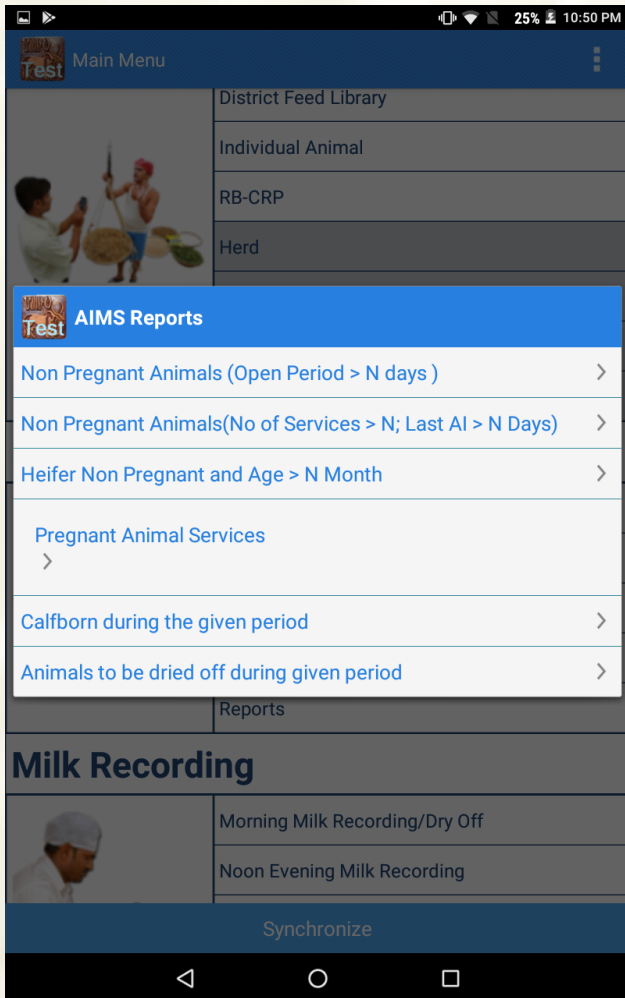|	
Field Worker	Operational Reports and Alerts
Project Coordinators	Review Reports
Area Coordinators	MIS Reports
Analyst	Analytical Reports
Cattle Owners	SMSs

- Role and Hierarchy based Reporting covering one or more Functional Areas.
- Provides Decision Supports as well as Operational Support based on the requirements.
- Provide Alerts to take action in Real Time.
- Web based Reporting on Common INAPH Portal at http://inaph.nddb.coop

Operational report from Smartphone
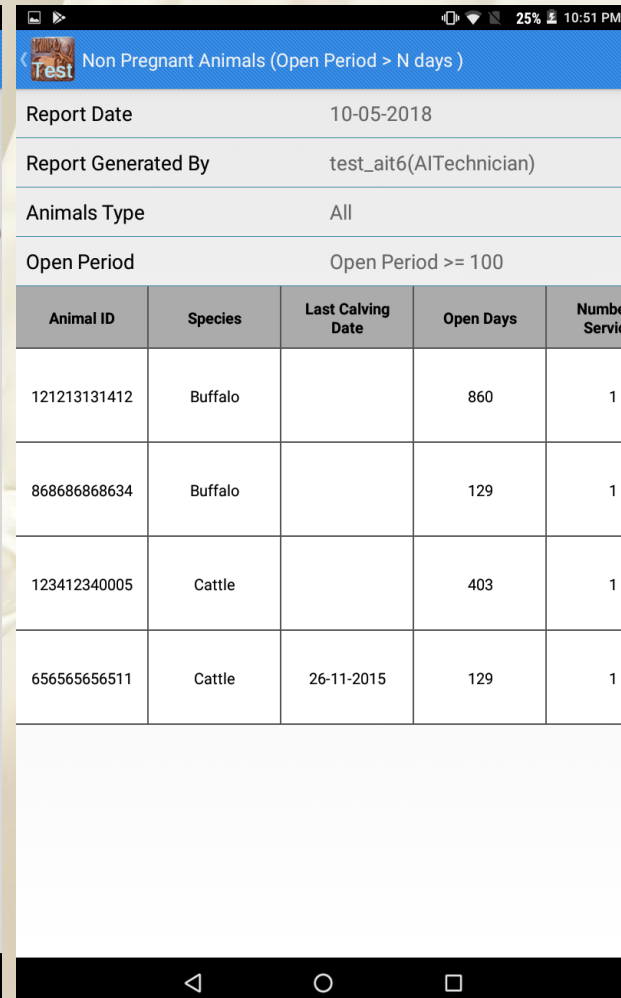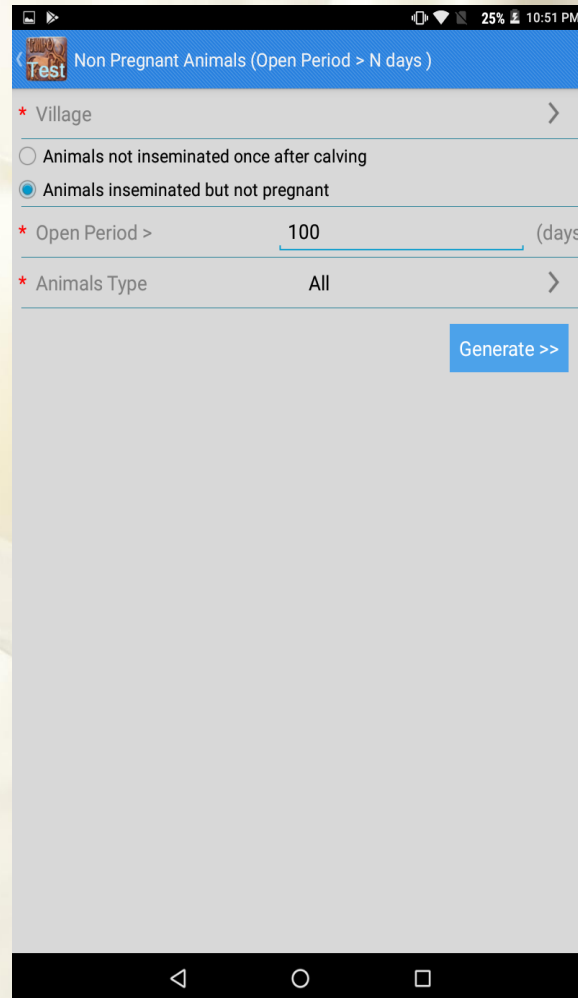
Alerts For Follow up Activities

Alerts on netbook

Alerts on Mobile

MIS:- Management Information System
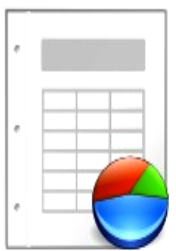
Analytical Reports

National Dairy Development Board
(INAPH) Information Network for Animal Productivity and Health

Welcome! sag_pc   Today's Date: 17-May-2018   Day: Thursday

Health Reports

1. Animal Treatment Summary
2. Vaccination Deworming Coverage
3. Disease Testing
4. Disease Pattern
5. Disease Specific Efficacy
6. Outbreak
7. Pathology Sample Summary

Nutrition Reports

1. Village wise Ration Balancing Coverage
2. RBP Impact
3. Month wise Progress Report
4. Location wise Progress Report
5. User wise Progress Report
6. Surplus-Deficit Status
7. Feed Cost Report
8. District Wise Feeding Practices
9. RBP Lactation yield and Curve Report
10. Feed Sample Regionwise Summary Report

Analytical Reports

1. Bull Wise Type Details
2. Bullwise Milk Production & Component Analysis
3. Reproduction Performance of Bulls - General Semen Doses
4. Bull wise-Nominated Mating Report
5. Test Dose Analysis Report
6. Reproduction Performance of Bulls - Test Semen Doses
7. Village Status Report - Production
8. Village Status Report - Lactation Wise

SMS Messages to Farmer

AI	• Animal Expected to come in heat during <Date1> to <Date2> • Animal Non-pregnant, open period …….. Months • Heifer Non-pregnant, open period …….months
PD	• Animal due for PD, inseminated on <Date1>
Calving	• Animal expected to calve during next week.
Milk Recording	• Animal Due for Milk recording • Abnormal Variation in Milk recording • Lactation record <Total Yld>, <Stnd.Yld>, <Milk Days>, <Av.Fat%>, <Protein%>, <Lactose%>

Nutrition Services

Ration Balancing

Capturing Animal Registration data

↓
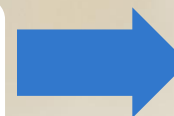
Capturing Animal Profile

↓

Capturing Feed Intake and Milk Yield data

↓

Selecting Locally Available Feeds & Fodder with Cost

→

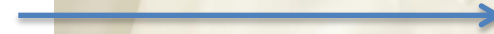**Least cost balanced ration formulation by software**

→

Balance Feeding to Animal

→

Need Based Fresh Formulation

→

Outputs

Reports

29-09-2021

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Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help

Nutrition>Ration Balancing>Individual Animal   Welcome! kb   Today's Date: 12-08-2008 Day: Tuesday

Fields marked with * are mandatory

Ration Balancing Individual

*Tagged Already   ○ Yes   ● No   *Tag Number: 5645454

Animal Details

*Sex: ○ Male   ● Female

*Species   ● Cattle   ○ Buffalo   *Body Weight(kg):   300.00

*Breed:
| GIR |
| KANKREJ |
| HF |
| JERSEY |

*Milking Status: ● In Milk   ○ Dry

*Class: ○ Heifer(Young) ● Adult   *Month after Calving: 5

*Age(Year and Month):   3   3   *Fat in Milk(%):   3.50

*Pregnant: ● Yes   ○ No   *Milk Production(Kg):   10

*Pregnancy Month: 3

Owner Details

*Owner Name: RK Jadhav   Affiliated Agency:

*Village: Pratapgar   Village Institution Name:

| ME |
| NE for Lactatic |
| NE for growth |
| RUP |
| RDP |
| NDF |
| MCP |

>>

<<

View Nutrient Requirements   Reset

start   Outlook Today - Micr...   Microsoft PowerPoint ...   NDDB - Information N...   5:06 PM

NDDB - Information Network for Animal Productivity and Health

Main Menu   Animal Registration   Breeding   Health   Nutrition   Milk Recording   Typing   Other Services   Miscellanous Reports   Logout   Help

Nutrition>Ration Balancing>Individual Animal   Welcome! kb   Today's Date: 12-08-2008 Day: Tuesday

Nutrient Requirements

	TDN	CP	Calcium	P
▶	3113	668	20	12
	3010	840	29.7	18.3
	311.3	66.8	2	1.2
	6434.3	1574.8	51.7	31.5

Nutrient Available in Existing Ration

	Feed Name	Feed Sub Class	Quantity(kg)	Rate	Amount	
	Guar Korma	Cake/Meal	1	4	4	0
	Lucerne Fodder	Green Fodder	10	1.25	12.5	1
	Paddy Straw	Straw	3	2.5	7.5	2
	Total	---	23	---	63	1

Dry Matter(DM) Requirement:

7.5 Kg to 12 Kg (2.5% to 4% of Body Weight)

Nutrients Surplus/Deficient in Existing Ration: (+)Surplus;(-)Deficient

	TDN	CP	Calcium	P
▶	+252.700	+674.3	-15.26	-16.27

Select Feed Items to be Balanced

	Feed Name	Feed Sub Class	Rate/Kg	Min(kg)	Max(kg)
	BIS Type-II	Compounded Feed	6	2	100
	Cotton Seed ...	Cake/Meal	8	0	100
	Cow Pea Fo...	Green Fodder	1.25	0	100
	Guar Korma	Cake/Meal	4	0	100
▶	Lucerne Fod...	Green Fodder	1.25	5	15
	Paddy Straw	Straw	2.5	0	10
	Mineral Mixture	Minerals	25	0.1	0.2

[Add Feed] [Delete Feed]

[Modify LCF Constraints] [Formulate Least Cost Balanced Ration]

Least Cost Balanced Ration

	Feed Name	Quanti	Rate	Amount	Dry Matter	TDN	CP	Calci	P
	Lucerne Fo...	5	1.25	6.25	900	585	153	7	1
	Paddy Straw	5.024	2.5	12.56	4521.49	1899	203.5	7.2	1.4
	Mineral Mixt...	0.146	25	3.65	146.15	0	0	29.2	17.5
	Total	16.031	---	49.91	10842.98	6434.3	2593.2	58.2	31.6

Cost of Ration/Kg Milk Production :   4.99   Only

cost of Ration/Kg   (as such) : 3.11   Only

Cost of Ration/Kg   (DM Basis) : 4.60   Only

[View Solution Details] [Shadow Pricing]

Last Recommended Date: [12-08-2008 ▼]   Ration Implemented: [▼]

Healthcare services

Health Services

Capturing Animal Registration information

↓

Capturing Vaccination & Deworming Activity Details

↓

Capturing Disease Testing Activity Details

↓

Capturing Treatment Activity Details

↓

Capturing Outbreak Details

Alert

Messages

Reports

Analysis of Pathology Samples at Laboratory

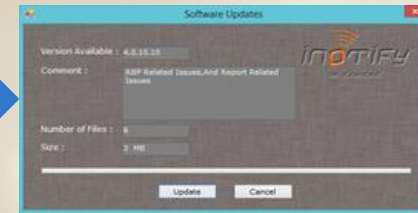Alerts to Veterinarians for Follow-up on Treatment, Vaccination , Deworming and Outbreaks

New Application Binaries Update Mechanism

Lab testing & Release of New Application Binaries

SMS Notification

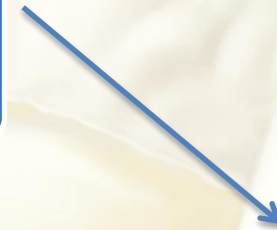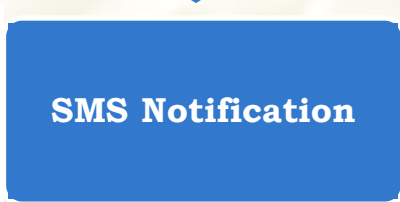**Update of New Binaries on Server**

Start Working on New Binaries

User working on Application

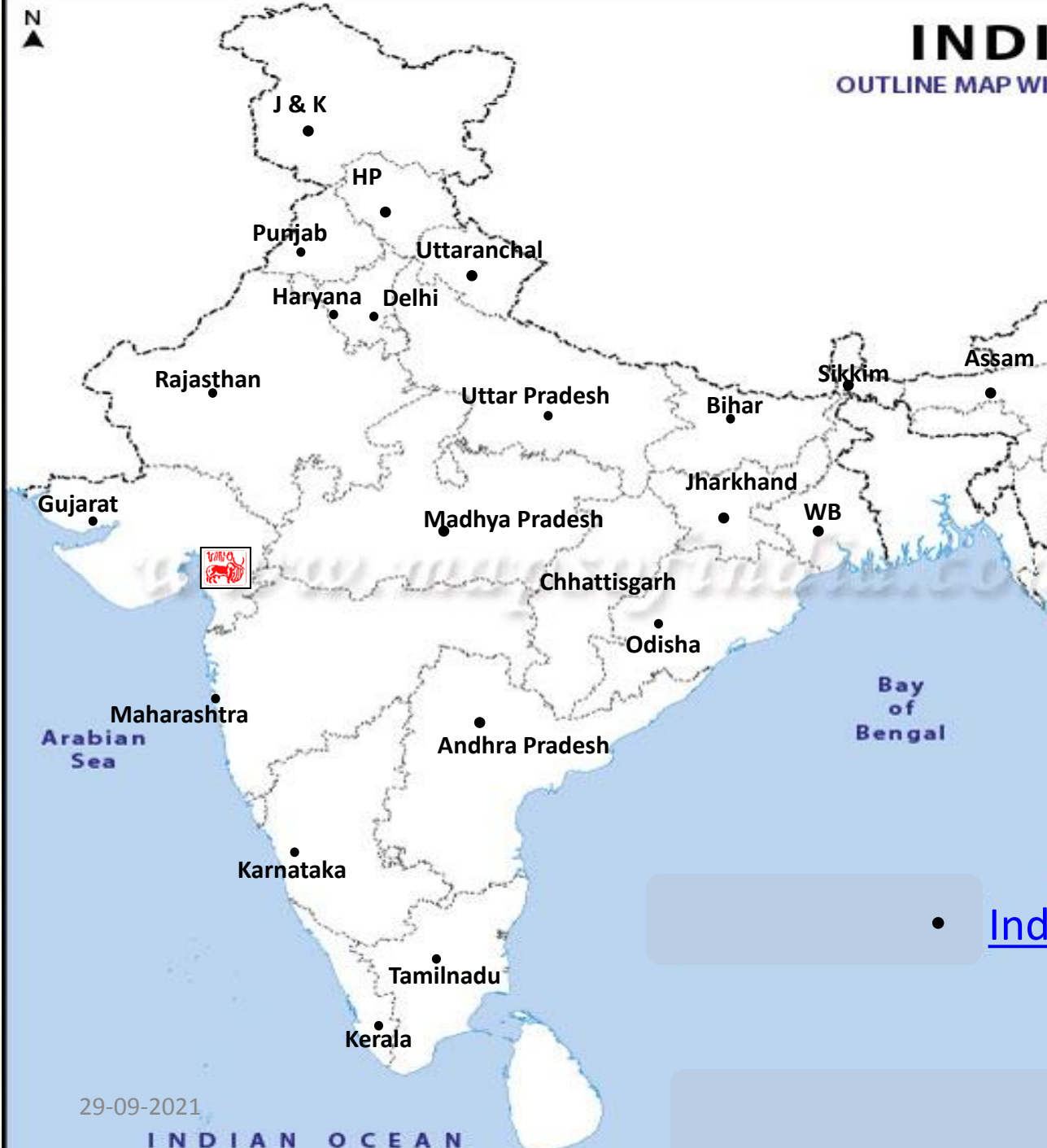**Message for New Binaries availability**

Update Binaries

29-09-2021

Progress so far

INDIA
OUTLINE MAP WITH STATES

Key parameters as on Date:	26th September 2021
Number of Projects	303
State	36
Districts	709
Villages	515,013
Nos. of Users	398,747
Animals Registered	180,103,350
Farmers Registered	61,710,754
AI done	49,233,272
Calving reported	6,713,671
Test-day milk records	4,739,215

- Index - INAPH (nddb.coop)

29-09-2021

Thank You